

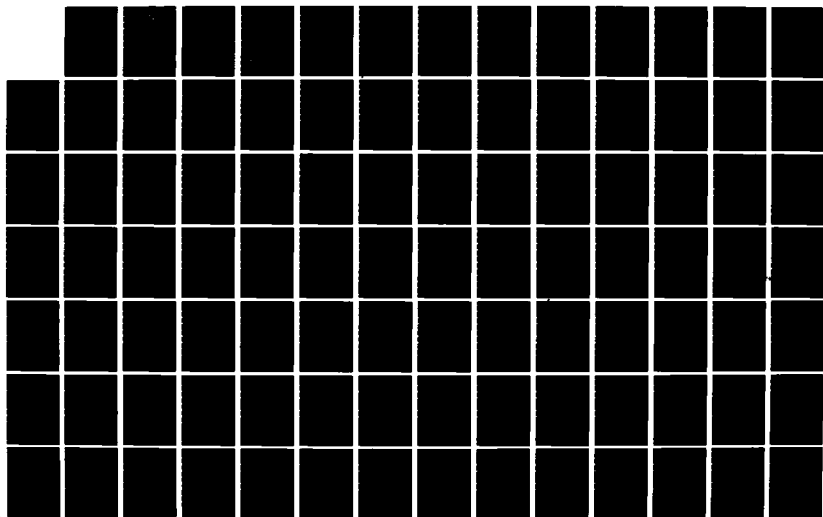
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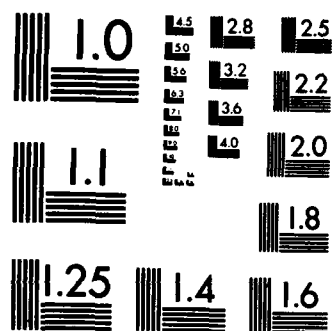
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AN INVESTIGATION OF THE CAUSES OF THE
CORONARY-PRONE (TYPE A) BEHAVIOR
PATTERN AND CORONARY HEART DISEASE

Michael S. Kalna, Captain, USAF

LSSR 47-83

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✓ This study investigates the relationships between the coronary-prone (Type A) behavior pattern, coronary heart disease (CHD), and stress. Behavioral and organizational data were obtained from 204 respondents; physiological data were obtained from 184 respondents. The physiological data consisted of cholesterol, HDL cholesterol, and cortisol (116 out of 184). Cholesterol, HDL cholesterol, and the ratio of cholesterol divided by HDL (ratio) were used as indicators of CHD. Cortisol was used as an indicator of felt stress. Factor analysis, Pearson product-moment correlation analysis, and multiple regression analysis were employed. The results indicate that a high-fat diet produces higher levels of cholesterol. Smokers have higher cholesterol levels than non-smokers. Exercise increases the HDL cholesterol level, especially in Type A subjects. Social support and smoking do not significantly affect felt stress (cortisol).
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AN INVESTIGATION OF THE CAUSES OF THE
CORONARY-PRONE (TYPE A) BEHAVIOR
PATTERN AND CORONARY HEART DISEASE

A Thesis

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Systems Management

By

Michael S. Kalna
Captain, USAF

September 1983

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This thesis, written by

Captain Michael S. Kalna

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN SYSTEMS MANAGEMENT

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COMMITTEE CHAIRMAN

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CHAPTER I

INTRODUCTION, LITERATURE REVIEW, AND RESEARCH HYPOTHESES AND QUESTIONS

Introduction

In the United States alone, some 600,000 Americans die each year from coronary heart disease. More than 35% of these deaths occur in persons less than 65 years of age (Chesney and Rosenman, 1982). Coronary heart disease (CHD) is a clinical disorder evolving from damage to the coronary arteries. The latter condition is referred to as coronary artery disease, or atherosclerosis. More commonly, atherosclerosis is known as hardening of the arteries (Glass, 1977:1):

Arteriosclerosis is a generic term which includes a variety of pathological conditions that cause the arterial walls to thicken and lose their elasticity. A common term for this disorder is hardening of the arteries. Atherosclerosis is a form of arteriosclerosis in which the innermost layer of the coronary artery thickens due to fatty deposits. These deposits (atheromata) decrease the diameter of the central channel (the lumen) of the coronary artery and hence impede the flow of blood.

Coronary artery disease is a "symptomless" disorder characterized by the thickening and deterioration of the coronary arteries that are the blood supply pipelines to the heart muscle itself (Friedman & Rosenman, 1974; Glass,

1977). In all probability, over 100 million Americans already have some degree of coronary artery disease (Friedman & Rosenman, 1974). The thickening of the coronary arteries begins early in life and is attributed to lesions produced by the arteries themselves as they twist and turn while carrying blood to the heart. The artery has its own healing procedure whereby newly formed cells cover the lesion, resulting in arterial thickenings. New lesions and the repair of the same occur continuously throughout childhood, adolescence, and adulthood (Glass, 1977).

Fortunately, for the majority of the population, coronary artery disease does not evolve into coronary heart disease. However, in 3% of the population, coronary artery disease does worsen, and by the time a person reaches 30 years of age, the coronary arteries are not able to supply the heart with sufficient blood for it to function properly. This, then, is coronary heart disease (Friedman & Rosenman, 1974).

Relatively little research has been done in relation to such variables as diet, smoking, and exercise and their role in the development of coronary heart disease. In this research, the relationships between diet, smoking, exercise, social support, stress, Type A behavior, and coronary heart disease will be examined. An attempt will also be made to develop a model used to predict coronary heart disease.

Literature Review

Chesney and Rosenman (1982) state that there are multiple causes of CHD. The most strongly associated causes are blood pressure, serum lipid lipoprotein levels, and cigarette smoking. These factors, however, even when coupled with variables such as diet, body weight, amount of physical activity, and family history, still explain less than 50% of the variance associated with CHD in all studies thus far.

Type A and Type B Behavior

Friedman and Rosenman (1974:9) propose that the principal cause of CHD is a specific behavior pattern that they have designated as Type A behavior.

In the absence of Type A Behavior Pattern, coronary heart disease almost never occurs before seventy years of age, regardless of the fatty foods eaten, the cigarettes smoked, or the lack of exercise. But when this behavior pattern is present, coronary heart disease can easily erupt in one's thirties or forties.

Ray Rosenman and Meyer Friedman, two cardiologists, are the pioneers in the field linking CHD with behavior. Their work originated with the Western Collaborative Group Study (WCGS) and was conducted between June 1960 and December 1961. Data were gathered from 3,524 men and included medical history, socioeconomic background, and

habits, as well as blood work and a psychophysiological test. CHD was observed in 113 subjects, who were subsequently eliminated from the study. The remaining 3,411 were divided into two age groups: (1) 39 to 49 years of age (2,416); and (2) 50 to 59 years of age (955). Coronary-proneness was also examined with other variables such as smoking, exercise habits, blood pressure, and cholesterol level (Rosenman, Friedman, Straus, Wurm, Kositchek, Hahn and Werthessen, 1964). This 8½ year investigation found that men initially labeled as Type A had more than twice the incidence of CHD as those initially classified as Type B's.

Friedman and Rosenman's (1974:84-85) definitions of Types A and B behavior are as follows:

Type A Behavior Pattern is an action-emotion complex that can be observed in any person who is aggressively involved in a chronic, incessant struggle to achieve more and more in less and less time, and if required to do so, against the opposing efforts of other things or other persons. It is not psychosis or a complex of worries or fears or phobias or obsessions, but a socially acceptable --indeed often praised--form of conflict. Persons possessing this pattern also are quite prone to exhibit a free-floating but extraordinarily well-rationalized hostility. As might be expected, there are degrees in the intensity of this behavior pattern. Moreover, because the pattern represents the reaction that takes place when particular personality traits of an afflicted individual are challenged or aroused by a specific environmental agent, the results of this reaction (that is, the behavior pattern itself) may not be felt or exhibited by him if he happens to be in or confronted by an environment that presents no challenge. For example, a usually hard-driving, competitive, aggressive editor of an urban newspaper, if

hospitalized with a trivial illness, may not exhibit a single sign of Type A Behavior Pattern. In short, for Type A Behavior Pattern to explode into being, the environmental challenge must always serve as the fuse for this explosion.

The person with Type B Behavior Pattern is the exact opposite of the Type A subject. He, unlike the Type A person, is rarely harried by desires to obtain a wildly increasing number of things or participate in an endlessly growing series of events in an ever decreasing amount of time. His intelligence may be as good as or even better than that of the Type A subject. Similarly, his ambition may be as great or even greater than that of his Type A counterpart. He may also have a considerable amount of "drive," but its character is such that it seems to steady him, give confidence and security to him, rather than to goad, irritate, and infuriate, as with the Type A man.

Jenkins (1971:309) expands on this definition:

The "coronary-prone behavior pattern" is considered to be the overt behavioral syndrome or style of living characterized by extremes of competitiveness, striving for achievement, aggressiveness (sometimes stringently repressed), haste, impatience, restlessness, hyperalertness, explosiveness of speech, tenseness of facial musculature and feelings of being under the pressure of time and under the challenge of responsibility. Persons having this pattern are often so deeply committed to their vocation or profession that other aspects of their lives are relatively neglected. Not all aspects of this syndrome or pattern need be present for a person to be classified as possessing it. The pattern is neither a personality trait nor a standard reaction to a challenging situation, but rather the effect of a challenging situation on a characterologically predisposed person. Different kinds of situations evoke maximal reaction from different persons.

It has been shown, however, that Friedman and Rosenman's original definition of Type B behavior is not accurate. Research has indicated that Type B individuals

are more introverted, relaxed, deferent, and patient (Chesney & Rosenman, 1982). While most of the studies concerning Type A Behavior deal strictly with adults, the conditions that foster Type A behavior occur during the first decades of life. Data has indicated that Type B youngsters behave like Type B college students and that Type A mothers may encourage Type A behavior in their children (Glass, 1977).

The Type A Behavior Pattern is divided into three major factors: (1) speed and impatience; (2) job involvement; and (3) hard-driving and competitive. Speed and impatience implies time urgency. It is characterized by rapid eating, hurrying others along, a short, strong temper, and irritability. Job involvement indicates the dedication a person has for his/her job. People scoring high in job involvement are for all intents and purposes "workaholics," working more overtime than is necessary and preferring promotions to pay. The last factor measures the hard-driving and competitive qualities of a person.

The Measurement of Type A Behavior Pattern

There are two primary ways in which Type A behavior has been measured. The first is the Structured Interview developed by Drs. Friedman and Rosenman. The interview is a special interaction between a trained interviewer and a subject. Established criteria enable the interviewer to

judge the interviewee. The rating of a subject depends on how the subject responds to the interviewer rather than on the content of the responses.

The second measurement is a questionnaire technique called the Jenkins Activity Survey (JAS). This questionnaire was developed for large-scale studies. It is a self-administered, multiple-choice questionnaire which is scored by computer. Scales were statistically developed based on Type A and B traits identified in the Structured Interview. JAS scores agree with the Structured Interview in determining behavior type 70-73% of the time (Jenkins & Zyzanski, 1980). For a complete discussion of JAS, see McDonald (1982).

Stress

Glass (1977) suggests that, in addition to Type A behavior, psychological stress has also been identified in enhancing cardiac disorders. Stress is defined as an internal state of the individual when he or she is faced with threats to physical or psychic well-being. However, it must be assumed that this internal state can be measured (i.e., increased or decreased heart rate, loss of concentration, or impaired interpersonal relations). Stressful life events have been linked to the risk of coronary disease (Jenkins, 1971). Perhaps it is stress and Type A

behavior in conjunction with each other that leads to a greater incidence of CHD.

Schuler (1980:192) suggests that:

There are three major ways in which individual qualities fit into this conceptualization of stress. First, individual needs and values define the desires of the individual and therefore help determine the perception of opportunity, constraints, and demands and the relative importance of outcomes. Second, individual abilities and experiences partially determine the perceived uncertainties of resolution of the dynamic conditions of opportunity, constraint, and/or demand and help influence the choice and appropriateness of strategies to deal with the stress. Third, individual personality characteristics influence an individual's perception of what constitutes opportunity, constraint, or demand and choice of the strategies to deal with the stress.

Psychological stress is the threat or anticipation of future harm, whether the harm is physical or psychological (Lazarus, 1966, 1975; Appley & Trumbull, 1967). When confronted with an environmental event, an individual first perceives this event as either threatening or non-threatening. This perception is referred to as "cognitive appraisal." If the event is perceived as threatening, the individual will attempt to eliminate or, at the very least, reduce the effects of the stressor stimulus (Glass, 1977). A subsequent occurrence will trigger a diminished stress response. Eventually, an individual will achieve adaptation (Glass & Singer, 1972). Psychological stress, then, can be defined in terms of stimulus conditions, response

variables, and with respect to mediating cognitive activity (Glass, 1971).

McGrath (1976:1356) views a stress situation as a four-stage, closed-loop cycle (Figure 1).

It begins with some condition(s) or set of circumstances in the socio-physical environment. If the situation is perceived by the focal person (with reference to whom it is a potentially stressful situation) as leading to some undesirable state of affairs if left unmodified (or some desirable state of affairs if modified), then it becomes a "stressful situation"--whether that perception is accurate or not. The focal person then "chooses" some response alternative (including escape or inaction). Then, he executes that response with the intention of changing his relation to the situation (in a "favorable" direction). That response does, in fact, have some consequences for him and for the situation though not necessarily the intended ones.

The four stages in McGrath's model are connected by four linking processes. These links provide the impetus for stress research. The process between stages A and B is referred to as the appraisal process, similar to Lazarus' (1966) term, "cognitive appraisal." The link between stages B and C is a decision-making process (Lazarus terms this secondary appraisal) during which an individual chooses a response(s) intended to counteract the undesirable features of the situation. The third link, between stages C and D, is the response or performance process. It yields a set of behaviors which can be evaluated. "The level of performance depends on ability, task difficulty, and on the standards used to assess performance" (McGrath,

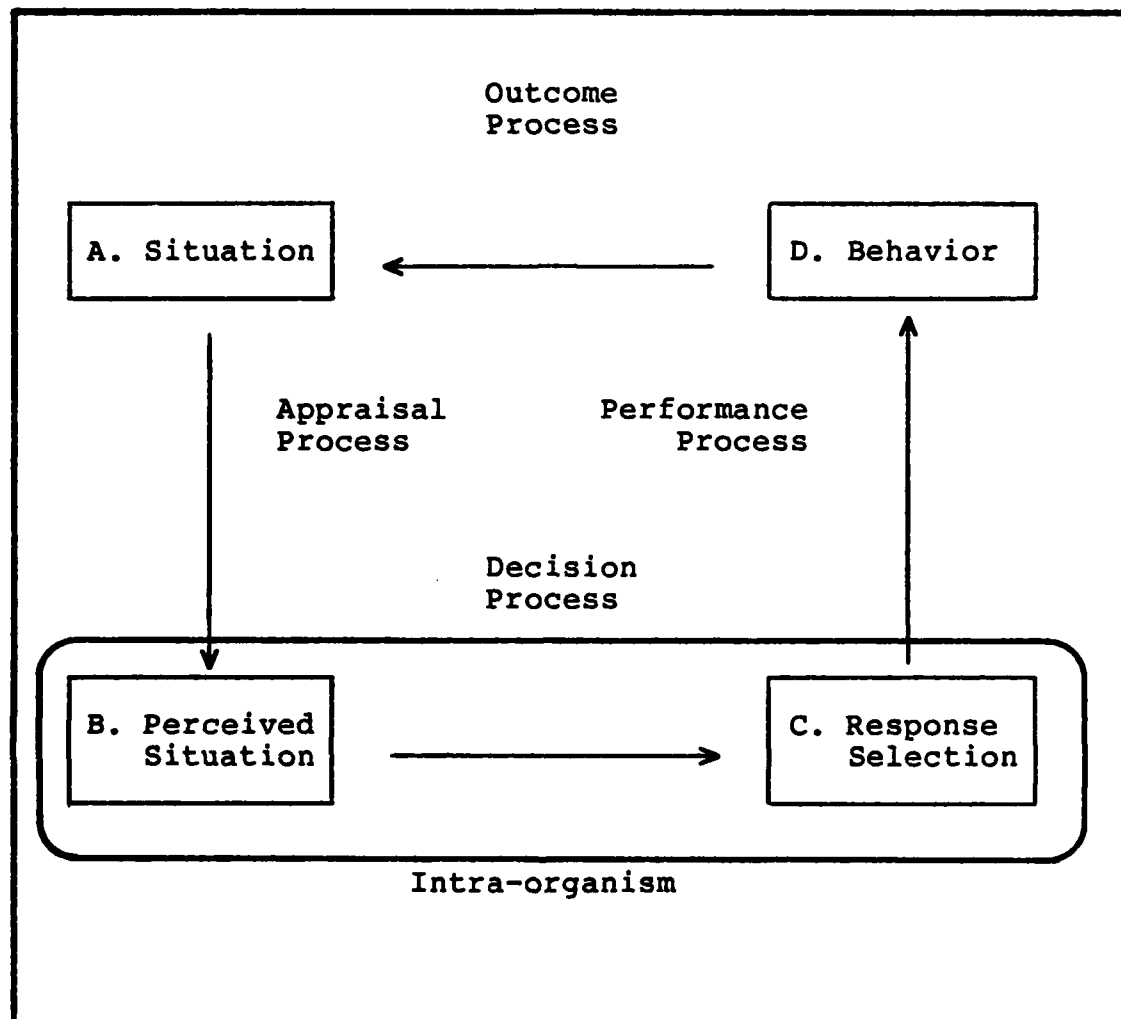


Figure 1. A Paradigm for Analysis of the Stress Cycle

1976:1356-1357)). The final process occurs between stages D and A and is often overlooked. This is the outcome or change process that occurs external to the individual.

McGrath applied this model to a study conducted in 1969. The study was of a Little League baseball league (60 players from four teams for 36 games). "Time at bat" was selected as the unit of activity. For each activity the following measures were obtained: (1) arousal or experienced stress; (2) batting performance; (3) favorableness of outcome; and (4) situational demand. From this study it was concluded that: (1) differences in situational demand do lead to differences in arousal; (2) age does not yield differences in arousal; and (3) age does yield an effect on performance.

Three general classes of psychological stressors have been connected with coronary heart disease. Glass (1977) lists these as: (1) general dissatisfaction with various aspects of life; (2) chronic or relatively long-term life events experienced by the individual as stressful; and (3) acute life events (defined by the individual as stressful). The most frequent cause of life dissatisfactions and chronic stress is an individual's work. Acute stress is precipitated by infrequent life events such as the death of a loved one or a sudden loss in self-esteem. Table 1 (Schuler, 1980:186) contains many of the symptoms of stress.

TABLE 1
INDIVIDUAL SYMPTOMS OF STRESS

1. Physiological

Short term: Heart Rate, GSR, respiration, headache
 Long term: Ulcer, blood pressure, heart attack
 Nonspecific: Adrenaline, noradrenaline, thymus deduction,
 lymph deduction, gastric acid production,
 ACTH production

2. Psychological Responses (affective and cognitive)

Fight or withdrawal
 Apathy, resignation, boredom
 Regression
 Fixation
 Projection
 Negativism
 Fantasy
 Expression of boredom with much of everything
 Forgetfulness
 Tendency to misjudge people
 Uncertainty about whom to trust
 Inability to organize self
 Inner confusion about duties or roles
 Dissatisfaction
 High intolerance for ambiguity, do not deal well with new or
 strange situations
 Tunnel vision
 Tendency to begin vacillating in decision making
 Tendency to become distraught with trifles
 Inattentiveness: Loss of power to concentrate
 Irritability
 Procrastination
 Feelings of persecution
 Gut-level feelings or unexplainable dissatisfaction

3. Behavior

A. Individual consequences

Loss of appetite
 Sudden, noticeable loss or gain of weight
 Sudden change or appearance: decline/improvement in dress
 Sudden change of complexion (sallow, reddened, acne)
 Sudden change of hair style and length
 Difficult breathing
 Sudden change of smoking habits
 Sudden change in use of alcohol

B. Organizational consequences

Low performance -- quality/quantity
 Low job involvement
 Loss of responsibility
 Lack of concern for organization
 Lack of concern for colleagues
 Loss of creativity
 Absenteeism
 Voluntary turnover
 Accident proneness

Work is an extremely important part of everyday life for most people and can consequently affect the overall health and happiness of an individual. Cooper and Payne (1978) contend that work impacts the lives and welfare of people both on and off the job. Dissatisfied workers are a cost to industry as well as to society. "Occupational stress has been increasingly implicated in the etiology of poor mental health and psychosomatic disease as well as coronary heart disease" (Ivancevich, Matteson, & Preston, 1982:373-374). There are two components to stress in any job: (1) the dimension or characteristics of the person; and (2) the environmental stressors at work. The interaction between these two components results in either coping or maladaptive behavior (stress-related disease). This interaction is labeled the person-environment fit (French, 1974; Lofquist & Dawis, 1969; Van Harrison, 1978). Stress can be viewed as the consequence of a lack of person-environment fit. The greater the incongruence of fit, the more significant the level of experienced stress (Lofquist & Dawis, 1969; Marshall & Cooper, 1978).

Figure 2, adapted from Ivancevich et al. (1982), presents stress as the outcome of the interaction of environment and person factors. A fit between a person and the environment occurs under harmonious conditions (Lofquist & Dawis, 1969) where there would be low levels

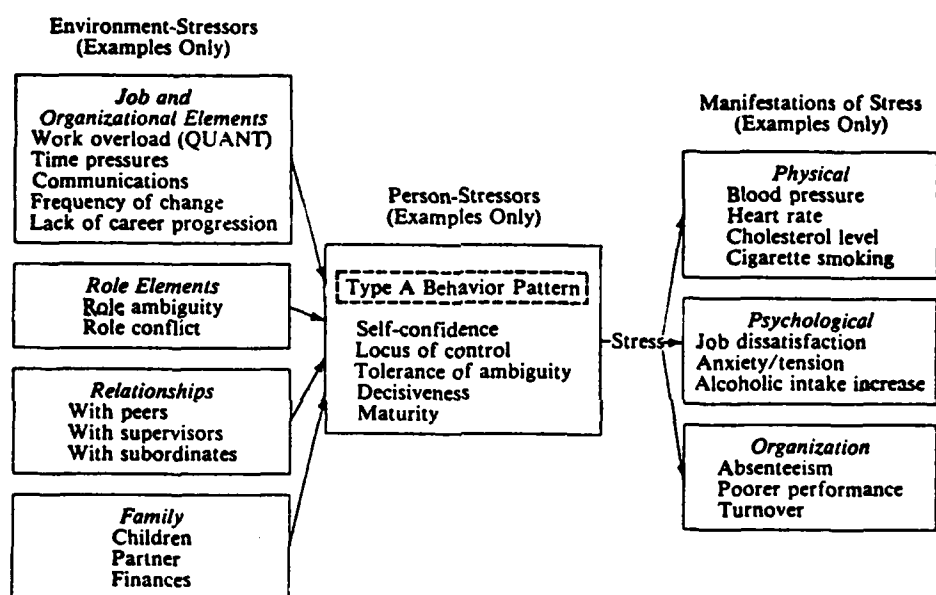


Figure 2. The Person-Environment Fit Framework for Studies of Occupational Stress

of stress and high levels of satisfaction (Van Harrison, 1978). Figure 2 suggests that an individual's experienced stress is the result of discrepancies between the environmental stressors and person stressors.

Ivancevich, Matteson, and Preston (1982) assert that even though much research has already been done in the field of occupational stress, there are still many gaps. Research is needed to (1) document stressors from occupations not historically regarded as high stress occupations; (2) update and examine relations of stressors and outcomes in professional occupations; and (3) examine the organizational factors and personality predispositions (particularly Type A/B behavior) that influences the amount of stress a person experiences.

Uncontrollable Stress

Uncontrollable stress arises when an individual's outcome is not determined by his/her response to a situation. Seligman (1975) states that uncontrollability is the perception of a noncontingency between responding and reinforcement. Therefore, an uncontrollable stressor is a potentially detrimental stimulus which a person can neither escape nor avoid. Glass (1977) says that the initial reaction of Type A's to an uncontrollable stressor is hyperresponsiveness or an attempt to exercise control over the stimulus.

Two of Glass' experiments dealt with the subject of hyperresponsivity. In the first, 40 college students (half Type A's and half Type B's) were subjected to noise bursts. The threat of uncontrollable stress motivated the Type A individuals to reassert environmental control. The Type B's, on the other hand, experienced a decrease in motivation and their performance subsequently was impaired.

The second experiment dealt with 45 male college undergraduates. Each subject performed a variety of problems ranging from mental tasks to tasks requiring both mental and motor activity. The results showed that enhanced performance among the Type A individuals occurred after noncontingent rather than contingent reinforcement. Glass (1977:85) believes that "the two experiments suggest that Pattern A behavior emerges in the presence of a particular eliciting situation, namely, a threat to environmental control."

When a Type A person realizes, through experience, that he/she cannot escape or avoid a situation, that individual will halt any effort to master the situation. This is referred to as hyporesponsiveness. With increasing levels of stress, the Type A individual shows a decrease in escape responses. The Pattern B individual, however, performs consistently in both escape and no-escape situations.

Exactly how Type A behavior increases the risk of CHD still remains unclear (Pittner & Houston, 1980).

According to Williams, Friedman, Glass, Herd, and Schneiderman (1978), one possibility is that excessive sympathetic nervous system activity by Type A individuals induces the increased risk. Dembroski (1978) and his associates found that Type A's demonstrated greater cardiovascular responses than Type B's during a variety of challenging perceptual motor and cognitive tasks. Also, Manuck, Craft and Gold (1978) and Manuck and Garland (1979) found that male Type A's responded to a challenging concept-formation task with greater systolic blood pressure than did Type B's. In these studies the tasks were psychologically challenging to see if there were differences between the two types of behavior. In another study (Dembroski, MacDougall, Herd, & Shields, 1979), when the importance of reaction-time tasks was played down, there were only small differences in cardiovascular responses between Type A's and Type B's. When the importance of a task was emphasized, however, there was a marked increase in Type A response. Another study found that the blood pressures in Type A subjects increased significantly when working on competitive reaction time tasks.

In contrast to psychological situations, physical stressors caused no cardiovascular response differences between Type A's and B's (Pittner & Houston, 1980). If a physical stressor is made significantly challenging, differences in responses between Type A and Type B subjects

could possibly occur. Also, the differences in psychophysiological responses between the two behavior types is greater under conditions of high stress such as a threat to self-esteem than under low stress.

Cholesterol

Friedman and Rosenman (1974) state that the serum cholesterol level varies in direct proportion to the degree of Type A Behavior. In studying a group of accountants, they found that cholesterol levels were raised during the peak tax return period but subsided after the April 15 deadline (Friedman, Rosenman, & Carroll, 1958). The accountants were studied for a six-month period beginning January 1. Blood samples were taken twice monthly and a dietary log was also kept. During the early part of April, prior to April 15 tax deadline, serum cholesterol levels were significantly increased. However, no change in dietary habits was observed. The average cholesterol level of all accountants fell sharply after April 15. They (Friedman & Rosenman, 1974:76) found that:

Subjects severely afflicted with this type of behavior pattern exhibited every blood fat and hormone abnormality that the majority of coronary patients also showed. In other words, the same blood abnormalities that so many of our colleagues believe precede and possibly bring on coronary heart disease were already present in our Type A subjects. To us, the logic is irresistible: the behavior pattern itself gives rise to the abnormalities.

Rahe and his associates (Rahe, Rubin, & Arthur, 1974; Rahe, Rubin, Arthur, & Clark, 1968; Rahe, Rubin, Gunderson, & Arthur, 1971; Rubin, Rahe, Clark, & Arthur, 1970) have conducted an extensive series of studies of the association of psychological states with serum cholesterol. Much of their research involved Navy personnel (water demolition trainees, submariners, and pilots in training situations). Cholesterol elevations occurred when subjects perceived stressful events to be out of their control. These elevations also occurred when the trainees were depressed, angry, fearful, and lethargic.

Over the past thirty years, it has been established that both elevated low-density lipoprotein (LDL) cholesterol and total cholesterol levels are directly associated with CHD. High-density lipoprotein (HDL) cholesterol, on the other hand, has an inverse relationship with CHD that is independent of LDL cholesterol or total triglyceride levels (Gordon, Castelli, Hjortland, & Kannel, 1977). Healthy persons with a parental history of CHD have lower levels of HDL than those with a negative family history of CHD (Feinleib & Kannel, 1976).

Since atherosclerosis begins during the first decades of life, it makes sense that a child's cholesterol level could predict the risk of CHD. "The identification of children with elevated lipids and lipoproteins is often based on sex- and age- specific values exceeding the 90th

or 95th percentile" (Tamir, Heiss, Glueck, Christensen, Kwiterovich, & Rifkind, 1981). The Framingham Study concluded that HDL was a significant risk factor for CHD even at very young ages (Brand, Rosenman, Sholtz, & Friedman, 1976). Cresanta, Srinivasan, Foster, Webber, and Berenson (1982), in their study, state that because of the striking changes in lipoprotein patterns during adolescence, a primary prevention program is needed. They contend that young men are being programmed for CHD.

In two related studies (Moll, Sing, Weidman, Gordon, Ellefson, Hodgson, & Kottke, 1983; Schrott, Clarke, Wiebe, Conner, & Lauer, 1979), coronary mortality of relatives was predicted from the cholesterol levels of children. A study done in Muscatine, Iowa (Schrott, et al., 1979) showed that relatives of children with cholesterol levels above the 95th percentile had twice the rate of coronary mortality. The Rochester Study (Moll, et al., 1983) found that both HDL and LDL cholesterol levels in grandchildren are stronger predictors than total cholesterol of CHD in grandfathers.

Cortisol

Two studies have examined the relationship between stress and cortisol and have shown that increased stress produces higher cortisol levels (Brown, Schalch, & Reichlin, 1971; Rahe, et al., 1979). Brown and his

colleagues, in studying the effects of stress in squirrel monkeys, found that cortisol levels increase until a certain level of stress is reached. Rahe et al. found that the rigors of a Navy underwater training course elevated the mean cortisol levels of all participants. Therefore, cortisol can be used as a measure of felt stress.

Diet

Russek (1965) found that humans under stress show no increased susceptibility to atherosclerosis unless the composition of the diet is high in fat. In a study accomplished by Ehnholm, Huttunen, Pietinen, Leino, Mutanen, Kostiainen, Pikkarainen, Dougherty, Iacono, and Puska (1982) in North Karelea County, Finland, it was found that significant reductions occurred in total cholesterol, LDL cholesterol, and HDL cholesterol levels when an alternative diet was adopted. Since the inhabitants of Mediterranean countries have a low incidence of CHD, a diet resembling that of Mediterranean nations was used. This particular diet had a fat content of only 24% compared to the Finnish diet consisting of approximately 40% fat. The results of the study agree with previous studies and demonstrate that cholesterol levels are sensitive to changes in dietary composition. A similar study by Fraser and Swannell (1981), in which Seventh-Day Adventists were observed, revealed significant relationships between diet and serum cholesterol.

From studying six Japanese population groups with different lifestyles, Ueshima and his colleagues (Ueshima, Iida, Shimamoto, Konishi, Tanigaki, Doi, Nakanishi, Takayama, Ozawa, & Komachi, 1982) determined that fat intake was on the rise in Japan. This increase in fat intake, largely due to the westernization of lifestyles in Japan, has increased the percentage of calories from fat to 22%, up from 15% in 1975. Consequently, there has been a higher incidence of coronary heart disease in Japan in recent years.

A study conducted by Russek and Zohman (1958) attempted to determine if certain variables were indicators of CHD. These variables included heredity, obesity, diet, exercise, and smoking. The findings of this study show that the progression of arterial thickenings was dependent on three major factors: heredity, a high-fat diet, and emotional strain of occupational origin. At least two of these factors were present in 95% of the coronary cases. Sixty-seven percent of the coronary cases had a family history of CHD. However, this did not mean that these subjects would eventually have CHD or that those without a family history of CHD would be immune. Fifty-three percent of the coronary subjects had a diet that was extremely high in fat. Finally, 91% of the coronary subjects experienced severe occupational strain. Regular exercise had no

bearing on CHD in this study. Smoking, however, was prevalent among the coronary subjects.

Smoking

It is well known that smokers increase their consumption of tobacco when exposed to increasing degrees of psychological stress. Russek (1965) conducted a survey of 12,000 professional men in fourteen occupations in order to determine the interrelationships among smoking habits, occupation-related emotional stress and coronary heart disease. "Smoking was not only found to be stress-related but also statistically correlated with the reported frequency of ischemic heart disease in these professional groups" (Russek, 1965:189). The study showed that the prevalence of the tobacco habit varies in different occupational categories with the degree of occupation-related stress. Smoking patterns appear to be a barometer by which inner tensions may be measured.

One interesting finding in Russek's (1965:193) study is that smoking may not play a major role in the genesis of coronary heart disease.

If a noxious agent exists in tobacco which is responsible in large measure for coronary attacks, the occurrence of the disease in relatively homogeneous groups should bear a clear relationship to exposure to this harmful element. On the contrary, however, we have found a higher prevalence of coronary heart disease among the professional persons who had never smoked than among those who had once smoked but subsequently discontinued the practice.

The conclusions drawn from this study are three-fold. First, emotional stress may be an important accelerating factor in atherogenesis when the diet is high in animal fat. Secondly, smoking patterns in an individual or group may provide an index by which emotional tensions may be relatively assessed. Finally, the relationship between smoking and the pathogenesis of coronary heart disease is not a clear one. Dr. Russek has no explanation for the low occurrence of CHD among persons who had once smoked. However, he suggests that "the discontinuance of the smoking habit may cause complete reversal of deleterious effects and relative "immunity" to ischemic heart disease" (Russek, 1965:194). Kicking the smoking habit might also imply a resilient personality response to stress.

Caplan, Cobb, and French (1975) examined the relationships of cessation of smoking with job stress, Type A/Type B behavior, and social support. Of the five million people who attempt to quit smoking each year, only one million are successful. Those who do succeed are a non-random group which differs in many ways, in terms of job stress and personality, from those who fail. According to Caplan et al. (1975:214),

Smokers, compared to quitters, also had higher scores on work load, responsibility, social support, and Type A characteristics, so that the occupational differences in the quit rate may be due partly to occupational differences in personality and perceived job environment.

Smokers compared to ex-smokers had the highest Type A scores while the trend was for heavy smokers to have higher Type A scores than light smokers. Smokers, however, reported the most social support, while quitters reported the least. One very interesting and unexpected result was that ex-smokers have less stress and Type A characteristics than those who have never smoked. The conclusions of this study are: (1) when social support is high, the level of job stress may be less of a motivating factor in the cessation of smoking than other factors; (2) level of stress appears to be a relevant factor in determining the quit rate of those low in social support; and (3) Type A persons are the least likely to quit smoking.

In a study performed by Lund-Larson and Tretti (1982), it was determined that changes in cigarette consumption do not cause any changes in serum glucose, systolic and diastolic blood pressure, and serum cholesterol. Changes in cigarette consumption do, however, have a statistically significant negative correlation to weight. An interesting phenomenon is that quitters, prior to quitting smoking, are heavier than persistent smokers.

Patel, Kodlin, and Strong (1980) conducted a study involving smoking and its effect on the atherosclerotic process. The transition rate from normal to fatty streak in the aorta is 1.4% (meaning that 1.4% of the remaining normal surface is being converted to fatty streaks each

year for nonsmokers). This value rises to 2.6% for light smokers and 3.1% for heavy smokers. The conversion rates of fatty streaks to raised lesions are also consistently higher in smokers. These lesions occur most frequently in the coronary arteries. The conclusion drawn is that "smoking is uniformly deleterious, increasing both fatty streak production and conversion in the aorta, and, at least conversion in the coronaries" (Patel, et al., 1980:154).

Exercise

Regular physical activity has been linked with a lower incidence of coronary heart disease. Plasma lipid and lipoprotein levels, which are associated with risk for CHD, may actually be altered with exercise, thereby causing a reduction of coronary risk (Brownell, Bachorik, & Ayerle, 1982). Many studies have shown that low levels of HDL cholesterol appear to be associated with increased risk of atherosclerotic CHD and that high HDL levels appear to be protective. Gordon, Witztum, Hunninghake, Gates, and Glueck (1983:517-518) state that:

Although the status of HDL cholesterol as a CHD risk factor is well established and the influence of physical activity and other lifestyle characteristics on HDL cholesterol is reasonably apparent, one cannot say with any confidence that increasing HDL cholesterol by modifying these characteristics actually decreases CHD risk. The long-term value of exercise and habitual physical activity in modifying cardiac morbidity and mortality is unknown, although there is some evidence that it is helpful.

- HDL cholesterol is a potential mediator of any such beneficial effect, especially in primary prevention of CHD. Therefore the positive association of HDL cholesterol with physical activity is of particular importance.

It has, in fact, been shown that highly trained athletes have more favorable lipid patterns than sedentary people.

An important feature, often overlooked when discussing the beneficial aspects of physical activity, is that there is stronger evidence linking physical activity to heart attack than linking physical fitness to heart attack (LaPorte, Cauley, Kinsey, Corbett, Robertson, Black-Sandler, Kuller, & Falkel, 1982). However, the problem with physical activity is quantification. Physical fitness can be measured through maximal oxygen intake tests but physical activity presently cannot be measured.

The use of physical fitness programs as a preventive approach to CHD has received growing attention. In a study performed by Blumenthal, Williams, Williams, and Wallace (1980), it was found that there was a significant reduction in the coronary risk profile of people who participated in a ten-week, structured exercise program. Improved physical condition and significant reductions in blood pressure and weight were observed. HDL increased, especially for Type A females and Type B males. This is the first study documenting the modification of Type A Behavior Pattern via participation in a regular exercise

program. "The reduction in Type A scores does not represent a personality change or a shift from Type A to Type B behavior. Rather, it represents a reduction in the magnitude of the Type A Behavior Pattern" (Blumenthal, et al., 1980:294).

In a similar study performed by Brownell, Bachorik, and Ayerle (1982), exercise in men increased the HDL level. Total cholesterol and LDL cholesterol either decreased or remained unchanged. Women significantly differed from the men. The results of the study are as follows:

| | <u>Total Cholesterol</u> | <u>LDL</u> | <u>HDL</u> |
|-------|------------------------------|------------|------------|
| Men | -4.4% | -6.0% | +5.1% |
| Women | -4.1% | -0- | -0- |

Therefore, the study indicates that a short-term exercise program will alter plasma lipid and lipoprotein levels more in men than in women. Several factors other than exercise may have influenced these results. Brownell and his associates suggest that plasma lipid levels can vary with diet, smoking, and alcohol intake. Therefore, it is possible that participants in exercise programs will make collateral changes in these areas as well. Three similar studies (Dressendorfer, Wade, Hornick, & Timmes, 1982; Hartung, Squires, & Gotto, 1981; Rotkis, Cote, Coyle, & Wilmore, 1982) have also shown that HDL is increased with exercise.

Social Support

Payne (1980) asserts that the value of social support is more pronounced in people under severe stress (i.e., natural catastrophies, concentration camps, and bereavement). It has been discovered that individuals who are able to retain close ties to family, friends, religious groups, or cultural groups during these periods of severe stress were better able to more easily adapt. Psychological mechanisms only have limited success in stressful situations. "Humans appear to need the constant physical and emotional contact with others to retain a sense of identity" (Payne, 1980:269). It seems that other people are the site for our identity.

Myers, Lindenthal, and Pepper (1975) conducted another study in which they found that those who were better integrated into society (married, higher socioeconomic status, etc.) were better able to cope with negative life events. It was also noted that those who were low on integration had poorer health. Payne (1980) points out that it is well documented that lower occupational levels and lower socioeconomic levels have poorer health and a higher rate of morbidity.

Pinneau (1976) believes that presently there is only an inadequate conceptual analysis of social support. Thus far, Caplan (1976) has offered the best analysis. He identifies the family as a support system where the family

is: (1) a collector and disseminator of information about the world; (2) a feedback guidance system; (3) a source of ideology; (4) a guide and mediator in problem-solving; (5) a source of practical service and concrete aid; (6) a haven for rest and recuperation; and (7) a reference and control group. The primary difference between family support groups and work support groups is that work support groups are limited to work issues only. Family support groups are concerned with every aspect of a person's life.

It has been shown that very demanding jobs can be performed without detrimental effects if they are conducted in conditions where the person has control. Payne (1980) suggests that these type of jobs can be even less stressful in conjunction with social and other supports (i.e., material). Although some research has been accomplished linking social support and stress, it has been very limited.

Additional Factors

A study by Rahe, Hervig, and Rosenman (1978) demonstrated that Type A behavior is nonheritable. Therefore, Type A behavior is a learned behavior. Cohen, Matthews, and Waldron (1979) point out that different cultural settings may play a role in Type A behavior. It was found that Japanese men living in Hawaii were more likely to develop CHD. However, the risk of CHD was only slightly higher than for their counterparts in Japan. Cohen et al.

propose that more research is needed regarding cross-cultural and subcultural groups. Their conclusions (Cohen et al., 1979:189) are:

First, it is possible that some aspects of a behavior pattern that are desirable but not directly related to CHD risk, can be discouraged. It is possible, for example, to be hard-working and not necessarily hard-driving and competitive. In short, it is possible to be productive but not self-destructive within any given culture. Second, our evidence indicates that cultural factors strongly influence the development of the coronary-prone behavior pattern and the associated risk of coronary heart disease. Therefore, it may be useful to consider ways in which we might change our cultural institutions, such as the schools, so they may be less conducive to the development of the coronary-prone behavior pattern.

The containment of coronary-prone behavior must begin very early in life because these first years can determine a person's affinity for CHD later in life (Friedman & Rosenman, 1974). Society as a whole must change its "hurry up and wait" and "I need it right now" attitudes. In the long run, overall well-being is likely to increase.

Problem Statement

Only the tip of the iceberg has been explored thus far in CHD research. A relatively small portion of this research relates factors such as diet, smoking, exercise, and social support to stress, Type A Behavior Pattern,

and CHD. In order to get at the root of coronary heart disease, these factors must be further examined. In addition to these factors, there is probably a host of other factors to investigate which contribute to CHD.

Statement of Research Objectives

This research has several objectives. First, I wish to examine the relationships between diet, smoking, exercise, and social support and stress, Type A Behavior Pattern, and coronary heart disease. Second, I would like to determine if any of these four factors (diet, smoking, exercise, and social support) have moderating effects on Type A Behavior Pattern, CHD, and stress. Finally, I will attempt to develop a linear model that will predict the risk of coronary heart disease.

Research Hypotheses and Questions

The preceding literature review and statement of research objectives have resulted in the following research hypotheses and questions.

H₁: A diet that is high in fat content will produce high levels of cholesterol in the blood. This hypothesis is based on the findings of several studies (Russek, 1965; Ehnholm et al., 1982; Fraser & Swannell, 1981; Ueshima et al., 1982) which have found significant relationships between diet and serum cholesterol.

H₂: Smokers will have higher cholesterol levels than non-smokers.

Hypothesis two is suggested by the findings of Russek (1965) and Patel et al. (1980).

H₃: Those persons on a regular exercise program will have a higher HDL cholesterol level and a lower ratio of total cholesterol to HDL than those who do not exercise.

The background for this hypothesis comes from research done by Brownell and his associates (1982) and by Gordon and his colleagues (1983).

H₄: Lower cortisol levels will be found in those who have a high degree of social support.

Payne (1980), Caplan (1976), and Myers et al. (1975) provide the background for the area of social support.

The research questions are as follows:

Research Question One. Can diet protect the Type A individual from the onset of CHD?

Research Question Two. Is a Type A individual, who is healthy and exercises frequently, immune from CHD?

Research Question Three. Does smoking enhance the Type A Behavior Pattern?

Research Question Four. Does smoking amplify felt stress?

Research Question Five. Can social support affect the intensity of Type A behavior?

The specific procedures used to test the hypotheses and research questions will be explained in the next chapter.

CHAPTER II

METHODOLOGY

The purpose of this research is to examine the relationships between coronary heart disease, Type A/B Behavior Patterns, stress, and related variables such as smoking habits, exercise frequency, diet, and social support. A questionnaire was used to measure behavior pattern and perceived stress. Felt stress and the risk of coronary heart disease were assessed through blood analysis. The data were gathered from Air Force employees and were analyzed by the means of such statistical techniques as Pearson correlation analysis, factor analysis, and multiple regression analysis.

Sample

The data were collected from an Air Force organization located at Randolph AFB, Texas. Both military and civilian personnel participated in the survey. The total sample size was 204. Of the 204 subjects completing the Stress Assessment Package (SAP), results from a blood analysis were available for 184.

The Stress Assessment Package (SAP)

The SAP is a third generation survey originally developed by Fye and Staton (1981). This particular questionnaire was developed by Major Nestor K. Ovalle, II, a faculty member of the Air Force Institute of Technology (AFIT), and includes many new innovative questions designed to better measure factors related to coronary heart disease, stress, and Type A/B Behavior Patterns. The SAP used in this research contains the following: (1) an instruction sheet; (2) a "Privacy Act Statement" which is mandatory for any survey administered to Air Force personnel; (3) 189 questions; and (4) a page for the respondents to list any medication currently being taken. The 189 questions in the SAP are categorized as follows:

| <u>Category</u> | <u>Number of Questions</u> |
|--------------------------------------|----------------------------|
| Personal Beliefs (Locus of Control | 5 |
| Job/Role Attitudes | 9 |
| Feedback-Based Self-Appraisal | 5 |
| Personal Feelings (Behavior Pattern) | 10 |
| Perceived Productivity | 4 |
| Job Inventory | 7 |
| Job Effort Rating | 1 |
| Goal Agreement | 1 |
| Performance Intentions | 1 |
| Organizational/Job Components | 13 |
| Supervisor Inventory | 9 |
| Job Stress Inventory | 25 |
| Organizational Inventory | 6 |
| Dealing With Others (Assertiveness) | 5 |
| Social Environment Inventory | 3 |
| Homelife Inventory | 6 |
| Physical Exercise | 5 |

| <u>Category</u> | <u>Number of Questions</u> |
|---|----------------------------|
| Social Support | 6 |
| Job Satisfaction | 5 |
| Personal Preferences (Rigidity-Flexibility) | 6 |
| Personal Needs (Tolerance for Ambiguity) | 3 |
| Personal Characteristics (Self-Esteem) | 6 |
| Food Consumption Inventory | 5 |
| Anxiety Symptoms | 14 |
| Physical Problems | 11 |
| Background Information | 18 |

Most of the questions in the SAP were based on a seven-point, Likert response scale. A copy of the SAP is included in the appendix.

Blood Analysis

The blood analysis was performed by the USAF School of Aerospace Medicine, Brooks AFB, Texas. Specifically, three components of the blood were determined: (1) total cholesterol; (2) HDL (high density lipoprotein) cholesterol; and (3) cortisol. Total cholesterol and HDL cholesterol levels were determined for 184 respondents. Cortisol levels, however, were determined for only 116 of the respondents.

As evidenced in the literature review, cholesterol is strongly related to coronary heart disease. Therefore, total cholesterol and HDL cholesterol will be used as indicators of CHD. The ratio of these two values (total cholesterol divided by HDL cholesterol) will also be used.

According to Fye and Staton (1981), the ratio is probably the best of these three indicators. Cortisol will be used as an indicator of felt stress. See Fye and Staton (1981) for the particular procedures used in the blood analysis.

Data Analysis Procedures

This section describes the statistical procedures employed in the data analysis. These procedures include Pearson product-moment correlation analysis, partial correlation analysis, factor analysis, reliability analysis, and multiple regression analysis. These procedures were all available in the Statistical Package for the Social Sciences (SPSS). SPSS is an integrated system of computer programs designed for the analysis of social science data (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975).

Correlation Analysis

The objective of correlation analysis is to determine the extent to which variation in one variable is linked to variation in another variable (Nie et al., 1975). Pearson product-moment correlation coefficients measure the strength of the linear relationship between two variables in a sample (Harnett, 1982). The correlation coefficient is denoted by the letter r . "When there is a perfect fit (no error), r takes on the value of +1.0 or -1.0, where the

sign is the same as the sign of the regression coefficient" (Nie et al., 1975:297). A negative value of r indicates an inverse relationship. If the sample values have no relationship at all, then r would equal zero. In this research effort, the Pearson product-moment correlation coefficients were used to measure the variability or lack of homogeneity in a variable. The Pearson product-moment correlation coefficients were obtained by using the SPSS subprogram PEARSON CORR.

Partial Correlation Analysis

"Partial correlation provides the researcher with a single measure of association describing the relationship between two variables while adjusting for the effects of one or more additional variables" (Nie et al., 1975:302). Partial correlation enables a researcher to eliminate the effect of control variables without manipulating the raw data. It aids the researcher in understanding and clarifying relationships between three or more variables. In this study, partial correlation was used to uncover spurious relationships, locate intervening variables, and help draw causal inferences. The SPSS subprogram PARTIAL CORR was employed to determine the partial correlations.

Factor Analysis

Factor analysis allows a researcher to determine if there is an underlying pattern of relationships that exist so that the data can be reduced into a smaller set of components (factors). Principle-component analysis transforms a set of variables into a new set of principle components that are orthogonal to each other. In the words of Nie et al. (1975:470):

No particular assumption about the underlying structure of the variables is required. One simply asks what would be the best linear combination of variables--best in the sense that the particular combination of variables would account for more of the variance in the data as a whole than any other linear combination of variables. The first principle component, therefore, may be viewed as the single best summary of linear relationships exhibited in the data. The second component is defined as the second best linear combination of variables, under the condition that the second component is orthogonal to the first. To be orthogonal to the first component, the second one must account for the proportion of the variance not accounted for by the first one. Thus, the second component may be defined as the linear combination of variables that account for the most residual variance after the effect of the first component is removed from the data.

Subsequent factors are similarly defined. Factor analysis was used in this study to break a large number of variables in a particular category, such as the stress variables, into a smaller number of components. The SPSS subprogram FACTOR was used with varimax rotation. The default value of 1.0 was used for the eigenvalues in most cases.

Reliability Analysis

Reliability refers to how accurate the estimate of the true score is in a sample. These estimates are based on the coefficient alpha. The coefficient alpha can range from 0.0 to 1.0. The reliability coefficient is zero if all the variation in observed scores is due to errors of measurement. It equals one if there is no error of measurement (Hull & Nie, 1982). The subprogram RELIABILITY was used to make internal consistency calculations for evaluating factors.

Multiple Regression Analysis

Regression analysis is concerned with the problem of estimating one variable, called the dependent variable, on the basis of other variables, called independent variables (Harnett, 1982). The most important uses of multiple regression according to Nie et al. (1975:321) are:

(1) to find the best linear prediction equation and evaluate its prediction accuracy; (2) to control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables; and (3) to find structural relations and provide explanations for seemingly complex multivariate relationships.

The SPSS subprogram REGRESSION was employed to accomplish the multiple regressions. REGRESSION was used to analyze the research questions as well as for the CHD model. The stepwise method was used in this research effort.

CHAPTER III

RESULTS

Factor Analyses and Reliabilities

Factor analyses were performed on the following question groups: stress inventory; personal feelings (behavior type); physical exercise; food consumption inventory; and social support. The results presented here were obtained using PA1. As a check, PA2 was also used and provided similar results in each case. The varimax method of orthogonal rotation was used.

Table 2 shows the factor analysis for the stress variables (questions 66-90). Using an eigenvalue of 1.05, five factors were obtained. I have designated these factors as: (1) supervisor-related stress; (2) stress due to overwork; (3) stress due to promotion/pay; (4) stress due to underwork; and (5) work/family conflicts. Supervisor-related stress consists of such items as relationship with one's boss, over-supervision, lack of participation, lack of communication, lack of job clarity, lack of feedback, and goal conflicts. Stress due to overwork is comprised of a perception of overwork, excessive challenges, time pressures, resource availability, and the nature of one's

TABLE 2
FACTOR LOADINGS FOR THE STRESS INVENTORY

| Question Number | Super- visor | Over- work | Promotion/ Pay | Under- work | Work/ Family Conflicts |
|--------------------|-----------------|---------------|-------------------|----------------|------------------------------|
| 66 | .23054 | <u>.75389</u> | .15068 | -.24362 | .04714 |
| 67 | .10394 | -.32100 | .00303 | <u>.59220</u> | .05319 |
| 68 | <u>.63329</u> | .11386 | .27750 | -.03460 | .25448 |
| 69 | <u>.17665</u> | .32509 | .19868 | <u>.48428</u> | .17524 |
| 70 | .46405 | .16367 | .23439 | <u>.59998</u> | .01958 |
| 71 | .19916 | -.19230 | .34077 | <u>.67817</u> | .08691 |
| 72 | .35987 | <u>.70815</u> | -.03515 | -.15318 | .12534 |
| 73 | <u>.60374</u> | <u>.02846</u> | .19858 | -.01918 | .27135 |
| 74 | <u>.62464</u> | .14572 | .08722 | .46713 | -.11725 |
| 75 | <u>.65416</u> | .23055 | -.00527 | .36015 | -.08441 |
| 76 | <u>.72785</u> | .18545 | .15151 | .30639 | .12754 |
| 77 | .04445 | <u>.84041</u> | .10456 | .02531 | .16582 |
| 78 | .31014 | <u>.66867</u> | .14030 | .12111 | .04941 |
| 79 | <u>.68525</u> | .22809 | .27428 | .23695 | .08795 |
| 80 | <u>.75590</u> | .25123 | .25860 | .17243 | .08511 |
| 81 | .08989 | .09749 | <u>.87333</u> | .07522 | .00919 |
| 82 | .30935 | .02815 | <u>.77700</u> | .26145 | -.04963 |
| 83 | .20296 | .19627 | <u>.68844</u> | .15804 | .15818 |
| 84 | .27493 | .11902 | <u>.74692</u> | .13471 | .13193 |
| 85 | .17519 | .01442 | -.02967 | -.11583 | <u>.72936</u> |
| 86 | .05652 | .17062 | .12619 | .25571 | <u>.78771</u> |
| 87 | .09001 | <u>.62314</u> | .13980 | .32187 | .19473 |
| 88 | .09340 | <u>.36427</u> | .13841 | .18143 | <u>.71216</u> |
| 89 | .35129 | .18210 | .27319 | <u>.39862</u> | .12859 |
| 90 | <u>.50543</u> | .23234 | .29048 | .47341 | .08988 |

work. Stress due to promotion/pay involves promotion opportunities, personal growth opportunities, salary, and incentive programs. The underwork factor consists of a perception of underwork, co-worker relationships, lack of authority, lack of challenges, and lack of training. Finally, the work/family conflicts factor is made up of excessive travel, familial attitudes about one's work, and conflicting demands between family and work.

The reliabilities for these five factors are contained in Table 3. All of the alpha coefficients are quite good ($>.70$).

TABLE 3
RELIABILITY COEFFICIENTS
FOR THE STRESS FACTORS

| Stress due to: | Coefficient Alpha |
|-----------------------|-------------------|
| Supervisor | .89 |
| Overwork | .84 |
| Promotion/Pay | .85 |
| Underwork | .71 |
| Work/Family Conflicts | .73 |

The behavior type variables (questions 20-29) factored very nicely. Four factors were obtained using

TABLE 4
FACTOR LOADINGS FOR BEHAVIOR TYPE

| Question Number | Speed/ Impatience | Competitiveness | Work Involvement | Hard Driving |
|--------------------|----------------------|-----------------|---------------------|-----------------|
| 20 | <u>.78334</u> | -.02540 | .04145 | .19555 |
| 21 | <u>.71112</u> | -.03138 | .12779 | .17258 |
| 22 | <u>.76992</u> | .22960 | .05258 | .06240 |
| 23 | <u>.78237</u> | .21139 | .03247 | .08403 |
| 24 | .09481 | <u>.86307</u> | .11108 | .17859 |
| 25 | .14882 | <u>.84864</u> | .18478 | .11827 |
| 26 | .00373 | .21524 | <u>.81993</u> | .13252 |
| 27 | .16621 | .06994 | <u>.85854</u> | .08338 |
| 28 | .10308 | .25238 | .18900 | <u>.75637</u> |
| 29 | .28627 | .06843 | .04835 | <u>.79400</u> |

an eigenvalue of .80: speed/impatience, competitiveness, work involvement, and hard driving. The factor loadings were very high, ranging from .71 to .86. The orthogonally rotated factor matrix appears in Table 4. The speed/impatience factor signifies a person's willingness to wait. The competitiveness factor indicates one's desire for winning. The work involvement factor measures the intensity of a person's work standards. Lastly, the hard driving factor measures the extent to which a person pushes himself or herself at work.

The corresponding reliabilities for these factors are contained in Table 5. The reliability coefficients are satisfactory, ranging from .54 to .79.

TABLE 5
RELIABILITY COEFFICIENTS FOR
THE BEHAVIOR TYPE FACTORS

| Factor | Coefficient Alpha |
|------------------|-------------------|
| Speed/Impatience | .79 |
| Competitiveness | .76 |
| Work Involvement | .66 |
| Hard Driving | .54 |

The final factor analysis involves what I consider "lifestyle" variables. These variables include social support (questions 116-121), exercise (questions 111-115), and food consumption (questions 142-146). Using the default of 1.0 for the eigenvalue, six factors resulted: exercise, work-related support, family support, fatty food consumption, dairy products consumption, swimming/cycling (a separate exercise factor). The exercise factor describes exercise frequency and intensity and jogging/running. Work-related support includes support from supervisors, top management, and co-workers. Family support consists of support from family, friends, and social/religious organizations. The fatty foods factor is comprised of red meat and fried foods consumption. Dairy products consumption consists of butter, eggs, whole milk, ice cream, cheese, and sour cream. The swim/cycle factor is an additional exercise factor involving strictly swimming and cycling. The varimax rotated factor matrix is depicted in Table 6. All factor loadings are high ($>.60$).

The reliabilities associated with these factors are included in Table 7. The reliability coefficients, for the most part, are satisfactory. However, the coefficients for dairy products consumption (.41) and swim/cycle (.43) are a bit low.

TABLE 6
FACTOR LOADINGS FOR THE LIFESTYLE VARIABLES

| Question Number | Exercise | Work Support | Family Support | Fatty food Consumption | Dairy Products Consumption | Swim/ Cycle |
|-----------------|---------------|---------------|----------------|------------------------|----------------------------|---------------|
| 111 | <u>.86041</u> | -.00021 | .05838 | -.21022 | -.00895 | .06044 |
| 112 | <u>.88873</u> | .04542 | .05081 | .04357 | .01270 | .04827 |
| 113 | <u>.78567</u> | .11340 | -.03669 | .06402 | -.03232 | .16835 |
| 114 | <u>.05817</u> | .04768 | -.09335 | .04221 | -.06248 | <u>.86132</u> |
| 115 | .19568 | -.04633 | .12341 | -.03571 | .14232 | <u>.74302</u> |
| 116 | .08272 | <u>.81469</u> | .05837 | -.04875 | -.09013 | .07604 |
| 117 | .00534 | <u>.75939</u> | .06905 | -.18190 | .02995 | .00025 |
| 118 | .06923 | <u>.74817</u> | .30159 | .00973 | -.04816 | -.08101 |
| 119 | -.02668 | .09323 | <u>.81258</u> | .10740 | -.15568 | .05859 |
| 120 | -.07317 | .21717 | <u>.79385</u> | -.12330 | -.04327 | .07025 |
| 121 | .16575 | .07504 | <u>.73849</u> | -.11919 | .06471 | -.09646 |
| 142 | .06316 | -.00920 | -.01437 | -.22582 | <u>.75841</u> | .10914 |
| 143 | .00523 | .09019 | -.03099 | .23251 | <u>.63753</u> | -.09454 |
| 144 | -.05970 | -.15439 | -.03769 | <u>.81650</u> | .06776 | -.03157 |
| 145 | -.00474 | -.05875 | -.06971 | <u>.87841</u> | .05540 | .04624 |
| 146 | -.12542 | -.30138 | -.09739 | <u>.16898</u> | <u>.61855</u> | .08759 |

TABLE 7
RELIABILITY COEFFICIENTS
FOR THE LIFESTYLE FACTORS

| Factor | Coefficient Alpha |
|----------------------------|-------------------|
| Exercise | .81 |
| Work-related Support | .72 |
| Family Support | .68 |
| Fatty Food Consumption | .71 |
| Dairy Products Consumption | .41 |
| Swim/Cycle | .43 |

The preceding factor analyses were also performed on various subgroups of the data base. I compared men and women and those less than 40 years of age with those 40 and older. Except for the stress variables, these factor analyses duplicated the results of the entire data base or were very similar. The factor analyses on the stress variables resulted in various groupings with several variables jumping back and forth between factors.

As a result of the factor analyses, I was able to group like variables in order to use just one indicative variable. For example, the speed and impatience variables (questions 20-23) were added together to yield one speed/impatience variable. This approach was used to compute

single variables for exercise, fatty foods inventory, dairy products inventory, competitiveness, work involvement, hard driving, and the five stress factors.

The Relationships Between the Variables of Concern

Pearson product-moment correlations were computed in order to determine relationships between variables. These correlations provided three types of information. First of all, they were used to evaluate the hypotheses established in Chapter I. Second, the correlations identified independent variables to be used in the regression analyses with the following dependent variables: total cholesterol, HDL, cortisol, the ratio of total cholesterol to HDL, and Type A behavior. Third, correlations can often explain unexpected relationships. "Listwise deletion" was used to account for missing data in the correlation analyses.

Table 8 shows the correlations between the dependent variables (total cholesterol, HDL, cortisol, and ratio) and the variables of concern.

Diet and Cholesterol - Evaluating Hypothesis One

Hypothesis one predicted that a diet that is high in fat content will produce high levels of cholesterol in

TABLE 8

PEARSON PRODUCT-MOMENT CORRELATIONS OF CHOLESTEROL,
HDL, CORTISOL, AND RATIO WITH VARIABLES OF CONCERN

| | Cholesterol | HDL | Cortisol | Ratio |
|---------------------------|-------------|---------|----------|--------|
| Diagnosed CHD | -.08 | -.06 | -.06 | -.06 |
| Diagnosed Ulcer | -.08 | -.04 | -.01 | .05 |
| Weight to Height | .20** | -.31*** | -.29** | .24*** |
| Exercise | .01 | .23*** | .05 | -.18** |
| Fatty Food Consumption | .14* | .14* | .04 | -.00 |
| Dairy Product Consumption | .07 | -.03 | .03 | -.03 |
| Impatience | -.06 | -.05 | -.07 | .01 |
| Competitiveness | .15* | -.13* | -.08 | .05 |
| Work Involvement | .14* | -.05 | -.08 | .13* |
| Hard Driving | .01 | .04 | .15 | -.06 |
| Work-related Support | .08 | .04 | .09 | .01 |
| Family Support | -.06 | -.01 | -.13 | -.04 |
| Age | .17* | -.09 | .12 | .15* |
| Smoking | -.18** | .07 | -.01 | -.08 |
| Swim | -.06 | .01 | -.11 | -.20** |
| Cycle | -.12 | .04 | .01 | -.11 |
| Stress from: | | | | |
| Underwork | -.03 | .06 | -.02 | -.10 |
| Supervisor | .06 | .00 | .11 | .02 |
| Promotion/Pay | -.02 | -.05 | -.12 | .02 |
| Overwork | -.04 | .02 | .02 | .00 |
| Work/Family Conflicts | -.08 | .11 | .08 | -.10 |

* $p < .050$

** $p < .010$

*** $p < .001$

the blood. Based on Table 8, there is a positive, significant ($p = .028$) linear correlation between diet (fatty food consumption) and cholesterol. Therefore, hypothesis one is accepted and the implication is that the consumption of fatty foods does, indeed, raise the cholesterol level.

In order to further support this hypothesis, the data base was divided into those having a high-fat diet and those having a low-fat diet. The results are as follows:

| | <u>Mean Cholesterol Level</u> |
|---------------|-------------------------------|
| High-Fat Diet | 240.47 |
| Low-Fat Diet | 219.05 |

The high-fat diet produces a cholesterol level that is approximately ten percent higher than that of a low-fat diet.

Smoking and Cholesterol - Evaluating Hypothesis Two

Hypothesis two suggests that smokers will have higher cholesterol levels than non-smokers. The correlations in Table 8 show that there is a negative correlation between smoking and cholesterol. This result can be explained by noting the construction of question 185 upon which this correlation was based. This question allowed for four responses: 1 = smoke; 2, 3 = quit smoking; and 4 = never smoked. Since an affirmative response for smoking lies at the low end of the scale, a negative correla-

tion would be expected. The correlation is significant ($p = .009$). Therefore, hypothesis two is accepted.

Further support of this hypothesis comes from the mean cholesterol levels for smokers, those who have quit smoking, and those who have never smoked. The following results were obtained.

| | <u>Mean Cholesterol Level</u> |
|--------------|-------------------------------|
| Smokers | 228.63 |
| Quit Smoking | 227.15 |
| Never Smoked | 211.90 |

Classifying those who have quit smoking and those who have never smoked as simply non-smokers results in a mean cholesterol level of 216.90.

Exercise and Cholesterol - Evaluating Hypothesis Three

The premise of hypothesis three is that exercise impacts a person's cholesterol level. The correlation between exercise and cholesterol is not significant. Consequently, hypothesis three must be rejected.

An interesting observation, however, is that there is a significant correlation ($p = .001$) between exercise and HDL cholesterol. HDL is the beneficial cholesterol that is present in the blood. This result indicates that a greater frequency of exercise and a greater intensity when exercising will actually increase the HDL cholesterol

level. This, in turn, will hinder the development of coronary heart disease.

The mean cholesterol level and mean HDL cholesterol level for those who exercise and those who do not exercise are presented below:

| | <u>Mean Cholesterol Level</u> | <u>Mean HDL Level</u> |
|-----------------|-----------------------------------|---------------------------|
| Exercise | 219.18 | 47.61 |
| Do Not Exercise | 223.47 | 46.68 |

Social Support and Cortisol -
Evaluating Hypothesis Four

Hypothesis four predicted that lower levels of cortisol, which is a direct measure of felt stress, would be lower in those receiving a higher degree of social support. Two linear correlations were evaluated, cortisol and support from those in the work environment and support from the family. The correlations in both cases were not significant. Therefore, based on these correlations, hypothesis four cannot be accepted.

The mean cortisol levels for those with little or no social support and those with significant social support were calculated.

| | <u>Mean Cholesterol Level</u> |
|------------|-------------------------------|
| No Support | 8.27 |
| Support | 8.05 |

Evaluating Research
Questions One through Five

Pearson correlations and multiple regression analysis were used to evaluate the research questions. Numerous regressions were run. The dependent variables employed were total cholesterol, HDL cholesterol, the ratio of total cholesterol to HDL, cortisol, and Type A behavior. The results of these regressions are contained in Tables 9 through 13. The independent variables are listed in the order in which they entered the regression equation. In addition to these regressions, four regressions were performed on extreme Type A individuals. The dependent variables used in these particular regressions were: total cholesterol, HDL cholesterol, the ratio between total cholesterol and HDL, and cortisol. The results are shown in Tables 14 through 17.

Diet of the Type A Individual
and Coronary Heart Disease -
Evaluating Research Question One

Research question one centers on determining whether a proper diet can protect a Type A individual from coronary heart disease. Conversely, it will determine whether an improper diet increases the risk of CHD. In the entire data base, there is a positive linear relationship between fatty food consumption and total cholesterol.

TABLE 9
THE PREDICTORS OF CHOLESTEROL

| Independent Variable | Standardized Regression Coefficient | F-Value | Dependent Variable- Cholesterol (N=159) | | |
|------------------------|-------------------------------------|---------|---|----------------|--------|
| | | | R ² | R ² | Change |
| Fatty Food Consumption | .09 | 6.09* | .04 | | .04 |
| Weight | 6.80 | 7.94** | .09 | | .05 |
| Age | .76 | 7.25** | .12 | | .03 |
| Competitiveness | 2.14 | 6.57** | .15 | | .03 |

* $p \leq .050$
 ** $p \leq .001$

TABLE 10
THE PREDICTORS OF HDL CHOLESTEROL

| Independent Variable | Standardized Regression Coefficient | F-Value | Dependent Variable- HDL (N=159) | | |
|----------------------|-------------------------------------|---------|---------------------------------|----------------|--------|
| | | | R ² | R ² | Change |
| Weight | -3.66 | 18.78* | .11 | | .11 |
| Exercise | .03 | 16.39* | .17 | | .06 |

* $p \leq .0001$

TABLE 11
THE PREDICTORS OF RATIO

| Independent Variable | Standardized Regression Coefficient | F-Value | Dependent Variable- Ratio (N=159) | | |
|----------------------|-------------------------------------|---------|-----------------------------------|----------------|--------|
| | | | R ² | R ² | Change |
| Weight | .46 | 12.37* | .07 | | .07 |
| Swim (exercise) | -2.36 | 11.41* | .12 | | .05 |

* $p \leq .001$

TABLE 12
THE PREDICTORS OF CORTISOL

| Independent Variable | Standardized Regression Coefficient | F-Value | Dependent Variable-Cortisol (N=95) | |
|----------------------|-------------------------------------|---------|------------------------------------|-----------------------|
| | | | R ² | R ² Change |
| Weight | -.66 | 7.93* | .08 | .08 |

* $p \leq .010$

TABLE 13
THE PREDICTORS OF TYPE A BEHAVIOR

| Independent Variable | Standardized Regression Coefficient | F-Value | Dependent Variable-Type A (N=172) | |
|-----------------------|-------------------------------------|---------|-----------------------------------|-----------------------|
| | | | R ² | R ² Change |
| Work/Family Conflicts | -.01 | 7.02* | .04 | .04 |

* $p \leq .010$

TABLE 14
THE PREDICTORS OF CHOLESTEROL
IN EXTREME TYPE A INDIVIDUALS

| Independent Variable | Standardized Regression Coefficient | F-Value | Dependent Variable-Cholesterol (N=29) | |
|----------------------|-------------------------------------|---------|---------------------------------------|-----------------------|
| | | | R ² | R ² Change |

No Independent Variables Entered the Equation

TABLE 15

THE PREDICTORS OF HDL CHOLESTEROL
IN EXTREME TYPE A INDIVIDUALS

| Independent Variable | Standardized Regression Coefficient | F-Value | Dependent Variable- HDL (N=29) | | |
|-------------------------|---|---------|-----------------------------------|----------------|--------|
| | | | R ² | R ² | Change |
| Exercise | .06 | 14.02* | .47 | | .47 |
| Cortisol | 2.38 | 13.75** | .65 | | .18 |

* $p \leq .005$ ** $p \leq .001$

TABLE 16

THE PREDICTORS OF RATIO IN EXTREME TYPE A INDIVIDUALS

| Independent Variable | Standardized Regression Coefficient | F-Value | Dependent Variable- Ratio (N=29) | | |
|-------------------------|---|---------|-------------------------------------|----------------|--------|
| | | | R ² | R ² | Change |

No Independent Variables Entered the Equation

TABLE 17

THE PREDICTORS OF CORTISOL IN EXTREME TYPE A INDIVIDUALS

| Independent Variable | Standardized Regression Coefficient | F-Value | Dependent Variable- Cortisol (N=18) | | |
|-------------------------|---|---------|--|----------------|--------|
| | | | R ² | R ² | Change |
| Weight | -1.46 | 10.72* | .40 | | .40 |

* $p \leq .005$

There is no significant correlation, however, with ratio. When considering just extreme Type A individuals, there are no significant correlations.

The multiple regression analysis showed that fatty food consumption is a good predictor of total cholesterol for the whole data base. It is not a predictor for ratio. For Type A individuals, fatty food consumption does not predict coronary heart disease.

The results, therefore, indicate that diet does not significantly protect a Type A person from coronary heart disease. This, then, answers the first research question.

Exercise Performed by the Type A
Individual and Coronary Heart Disease -
Evaluating Research Question Two

Research question two deals with the idea of immunity from coronary heart disease for the Type A individual who exercises frequently. For the population as a whole, there is a fairly good correlation between HDL cholesterol and exercise. Remember that HDL is the beneficial cholesterol in the blood. The multiple regression analysis shows that exercise is a good predictor of HDL. The results for Type A persons are similar. The correlation between HDL and exercise is much stronger, however. The correlation coefficient is .43 ($p = .006$). The exercise variable entered first into the regression

equation. The R^2 value of .47 is very favorable.

Based upon these results, it is clear that exercise does play an important part in the prevention of CHD.

Smoking and the Type A Behavior Pattern - Evaluating Research Question Three

This research question involves the relationship between smoking and behavior pattern. The Pearson correlation between smoking and the Type A Behavior Pattern is $-.13$ ($p = .033$). This negative correlation, due to the nature of the question structure, actually means that smoking does influence behavior pattern.

Smoking did not enter into the multiple regression equation as a predictor variable of Type A behavior. The correlation, however, is strong enough to suggest that smoking does have an impact on behavior. Further research in this area should be encouraged.

Smoking and Felt Stress - Evaluating Research Question Four

Research question four deals with the possibility of increased felt stress (higher cortisol levels) among smokers. For the entire data base, there is no significant correlation between smoking and cortisol. However, when only Type A subjects are considered, the Pearson correlation is $-.46$ ($p = .014$). Once again, the direction of

this correlation indicates that there is a fairly strong relationship present.

In the multiple regression analysis with cortisol as the dependent variable, smoking did not enter the equation. Therefore, the results are a bit hazy. But since the relationship between smoking and cortisol for Type A subjects is quite strong, it is concluded that smoking does influence felt stress in some manner. This area is yet another candidate for future research.

Social Support and the Intensity
of Type A Behavior Pattern -
Evaluating Research Question Five

The final research question concerns social support and Type A behavior. There are no significant correlations between behavior type and either of the support variables. The multiple regression involving Type A behavior as the dependent variable also did not provide any encouraging results as social support did not enter the equation.

An interesting result, however, occurs when the data base is divided into those with a high degree of social support and those with a low degree of social support. The Type A scores for those receiving low social support are, on the average, 6% higher than those receiving a high degree of social support. This result indicates that social support could possibly be related to behavior

pattern when we distinguish between very high Type A subjects and very high Type B subjects. Future research is needed in this area.

A Model Used to Predict Coronary Heart Disease

The final objective of this research effort was to attempt to develop a linear model that would predict coronary heart disease. After trying different combinations of dependent and independent variables, the best model appears to be the multiple regression model presented in Table 10. The dependent variable in this model is cholesterol and the predictor variables are fatty food consumption, weight, age, and competitiveness.

This model seems to be quite good. Analyzing each of the predictor variables, one can see why. Fatty food consumption directly affects the total cholesterol level. With an increased cholesterol level, more plaque will build up in the coronary arteries causing blockage and, eventually, coronary heart disease. A person's weight can affect his or her likelihood of CHD. The greater the weight, the greater the stress placed on the heart. Age is a good predictor because of the fact that after a certain period of time the coronary arteries and the heart do wear out. Friedman and Rosenman (1974) point out that most people in their seventies have some form of coronary artery disease.

Finally, competitiveness, a Type A characteristic, would be a good predictor because a person who is very competitive is very aggressive and, consequently, stresses the coronary arteries.

Therefore, for the purposes of this research, the above model seems to be the most accurate. Different data bases would most likely lead to varied models for predicting CHD depending upon the group from which the sample was chosen.

CHAPTER IV

SUMMARY AND CONCLUSIONS

The purpose of this study has been to examine the causes of Type A Behavior Pattern and coronary heart disease and the relationships between them. In order to accomplish the objectives of the study, four research hypotheses and five research questions were proposed after reviewing pertinent literature. Tests were then performed on each of the hypotheses and questions and the results subsequently evaluated. This chapter identifies limitations of the study, summarizes the findings, and provides conclusions for this research effort.

Limitations

Sample

The entire sample of 204 respondents was actually the result of the same survey being administered at two different times (131 in December, 1982, and 73 in June, 1983). Although the survey was given to employees at the same location, the surveys were administered six months apart. This time period may not seem critical. Certain organizational changes, however, could have occurred during

this time period that would have significantly altered the responses to the survey. In addition to organizational changes, individual lifestyles could have changed within this time frame. Hence, grouping both of these samples might have produced results that are not representative of the population as a whole.

Sample Size

A sample size of 204 is actually quite small when dealing with a survey of this nature. Recall that Friedman and Rosenman included over 3,500 persons in their initial study of coronary heart disease. Missing data further reduced the number of usable cases for analysis. Additionally, blood work was available for only 184 of the respondents. While the total cholesterol and HDL cholesterol levels were determined for all 184, the cortisol level was available for only 116. Consequently, the sample, once again, may not be representative of the entire population.

Data Analysis

Correlation analysis and multiple regression analysis determine only the linear relationships between variables. Log-linear and curvilinear relationships have not been identified. Such possible relationships could present the data in a different perspective.

Summary and Conclusions

The association between a diet that is high in fat content and cholesterol levels is further supported in this study and is addressed in hypothesis one and research question one. In fact, diet was one of only a few variables to significantly correlate with cholesterol. This means that one's cholesterol level is in part affected by diet. In order to deter the onset of coronary heart disease, then, only moderate or minimal amounts of fat should be consumed. A diet that consists largely of fish, chicken, and raw vegetables and fruit would be ideal. It is difficult, if not impossible, not to eat minimal quantities of fat, for it is present in much of our food. Monitoring one's diet is the best possible way to control fat intake. Preventive measures are worth defending against coronary heart disease. Although HDL cholesterol levels also increase with increased fat intake, there seems to be no derived benefit because the rise in total cholesterol more than offsets the rise in HDL. Consequently, the ratio of total cholesterol to HDL either remains constant or increases.

Hypothesis two and research questions three and four concerned evaluating the effects of smoking on cholesterol level, Type A behavior, and felt stress. The findings indicate that smoking has a detrimental impact in

each case. Smokers have higher cholesterol levels than non-smokers, the degree of Type A behavior is greater for smokers, and the cortisol level (degree of felt stress) is greater for smokers. It is not known whether smokers have a high-fat diet or not. If not, then the reason for the high cholesterol levels could be caused by some chemical in cigarettes, cigars, or pipe tobacco. As for the degree of Type A behavior, there is probably some chemical reaction from tobacco that increases a person's drive and aggressive nature. Or perhaps, it is the withdrawal from or the dependency on these chemicals which causes a more intense Type A pattern. Finally, felt stress is intensified among smokers. Tobacco can possibly inhibit the body's defense mechanisms that combat stress, thereby increasing the cortisol levels in the blood. It seems to be a vicious cycle, because under greater stress, smokers smoke more. Therefore, it can be concluded that smoking does have an adverse effect on one's health and increases the risk of coronary heart disease.

Hypothesis three and research question two dealt with exercise and its relationships to cholesterol, HDL cholesterol, and Type A behavior. While there was no significant correlation between exercise and cholesterol, there was a significant correlation between exercise and HDL. This means that with more exercise, the HDL level will rise. Assuming that total cholesterol at worst

remains unchanged, then the ratio will decrease. Ratio has been shown to be one of the best predictors of coronary heart disease in previous research (McDonald, 1982). Therefore, the risk of CHD decreases with greater exercise. There is an even greater correlation between exercise and HDL in Type A individuals. Hence, Type A individuals can reduce their risk of CHD by funneling their energies into exercise instead of into their aggressive, competitive, and hard-driving traits. Exercise could also possibly alter the intensity of the Type A Behavior Pattern. A reduction in the intensity of Type A behavior should further reduce the risk of coronary heart disease.

Social support was looked at in hypothesis four and research question five. It seems that social support does not greatly influence either cortisol or Type A behavior. Support from both the work environment and from family and friends was examined. In the case of felt stress, the cortisol level was nearly equal in support and non-support groups. However, when examining Type A individuals, it was found that there was a difference in cortisol levels. Those receiving a low degree of social support had a mean cortisol level that was 6% higher than high-support individuals. It appears that social support, then, especially family support, can have a sobering effect on Type A behavior. The answer to this result could be that those with low support work a greater number of hours and

actually do not allow enough time for any support.

The results of this study uncover some issues that should be examined in future research.

1. Smoking seems to be a very important factor in the research of coronary heart disease. Exactly how smoking influences such variables as stress and Type A behavior is not known. Chemical analyses should be conducted to determine what reactions are caused by smoking and how these reactions affect bodily functions.

2. The Stress Assessment Package in this study did not provide any information on alcohol consumption. Future surveys should include several questions regarding alcohol intake in order to determine its effect on coronary heart disease.

3. The role of social support in the development of coronary heart disease was not made clear in this research. Further attempts should be made to determine if there is any link between social support and coronary heart disease.

4. Although the model to predict CHD in this study is the best under these circumstances, a better model probably exists. A much larger data base, however, would be needed to develop a more relevant model. The development of such a model could be the topic of a future thesis.

5. Only several types of exercise were mentioned in the Stress Assessment Package. Running, swimming, and

cycling might not be the only forms of exercise that significantly affect HDL cholesterol. A study should be undertaken to evaluate the effects of all types of exercise on the HDL level. This same study could also investigate physical activity and its effect on total cholesterol and HDL cholesterol levels.

6. The relationship between diet and exercise should be explored to determine if one variable might have a moderating effect on the other.

In conclusion, it has been shown that coronary heart disease is, in part, caused by such factors as stress and Type A behavior. It is fascinating to see the intricate relationships between stress, exercise, smoking, Type A behavior, and coronary heart disease. It is plain to see that no one factor by itself is responsible for the development of coronary heart disease. Rather, it is the combination of these factors, and possibly other factors, which contribute to coronary heart disease. Hopefully, this research has provided a bit more insight into the complex subject of coronary heart disease.

APPENDIX
THE STRESS ASSESSMENT PACKAGE

SCN 81-115
STRESS ASSESSMENT PACKAGE
(Version 3)

The Stress Assessment Package (SAP) is a tool designed to aid in measuring your personal stress level and determine some of the original components that may contribute to stress.

You will find the terms work group, organization, and supervisor used extensively as you complete this questionnaire. The term work group refers to a group of individuals working for the same supervisor, while the term organization refers to the overall organizational unit. For example, if your position is within a section of a squadron then the squadron is your organization and your section is your work group.

Using the answer sheet provided, please mark your responses with a number 2 pencil only. Make heavy black marks that completely fill the appropriate space.

It is important that you answer all items honestly. This is the only way an accurate stress assessment can be made.

Your individual responses will be held in the strictest confidence, and will not be provided to any organization or persons. Only those directly involved in this research will have access to your completed SAP.

In the information block labeled "your work group code," fill in the appropriate code provided by your survey monitor and blacken the corresponding spaces.

EXAMPLE:
YOUR WORK
GROUP CODE

| | | | | | |
|-----|-----|-----|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 5 |
| [>] | [>] | [>] | [>] | [>] | [>] |
| [x] | [x] | [x] | [x] | [x] | [x] |

Follow the same procedure for the other blocks as they pertain to you. Fill in yes or no for the supervisor block. If you are a supervisor, fill in your subordinate's work group code, also given by the survey monitor. If you are employed by the Department of Defense, fill in the "Base Unit" code and your Air Force Specialty Code (AFSC).

In block 216, blacken the numbers corresponding to your NORMAL Monday through Friday WAKE-UP TIME using a 24-HOUR CLOCK. For example, you normally get up at 1 p.m. for shift work. Using the 24-hour clock, you would blacken in the numbers for 1300, one number per column.

EXAMPLE:

| | | | |
|-----|-----|-----|-----|
| 216 | | | |
| [0] | [0] | | |
| | [1] | [1] | [1] |
| [2] | [2] | [2] | [2] |
| [3] | | [3] | [3] |

If you are in the military service, or are a civil service employee, use block 217 to fill in your rank corresponding to the code below:

| <u>Officers</u> | <u>Civil Service</u> |
|------------------------|------------------------|
| | <u>GS</u> |
| 0-1 fill in 0-1 | GS-1 fill in 4-1 |
| 0-2 fill in 0-2, etc. | GS-2 fill in 4-2 |
| | : |
| <u>Warrant Officer</u> | : |
| | : |
| W-1 fill in 2-1 | GS-7 fill in 4-7 |
| W-2 fill in 2-2, etc. | SES fill in 4-16 |
| | : |
| <u>Enlisted</u> | <u>WG</u> |
| E-1 fill in 3-1 | WG-1 fill in 5-1 |
| E-2 fill in 3-2, etc. | WG-2 fill in 5-2 |
| | : |
| | : |
| | : |
| | WG-7 fill in 5-7, etc. |

EXAMPLE

| | | |
|--------------------------|-----|--------------------------|
| 217 | | |
| <input type="checkbox"/> | [0] | [0] |
| [1] | [1] | [1] |
| [2] | [2] | <input type="checkbox"/> |

In block 221, fill in your age by blackening the appropriate numbers. For example, a 32 year old person would use the 3 in the first row and the 2 in the second row.

EXAMPLE

| | |
|--------------------------|--------------------------|
| 221 | |
| [0] | [0] |
| [1] | [1] |
| [2] | <input type="checkbox"/> |
| <input type="checkbox"/> | [3] |

The scales provided next are either 5, 6, or 7-point scales with an additional space provided for not applicable (NA) responses. For example:

Scale:

| | |
|-------------------------|--------------------------------|
| NA = Not Applicable | 4 = Neither Agree nor Disagree |
| 1 = Strongly Disagree | 5 = Slightly Agree |
| 2 = Moderately Disagree | 6 = Moderately Agree |
| 3 = Slightly Disagree | 7 = Strongly Agree |

Item Statement:

1. My supervisor is a good planner.

Answer Response:

| | | | | | | | | | |
|---|----|-----|---|---|---|---|---|---|--------------------------|
| D | NA | | | | | | | | |
| | | 001 | 1 | 2 | 3 | 4 | 5 | 6 | <input type="checkbox"/> |

In the example above the individual selected option 7 since he or she strongly agreed with the statement. If the response had been considered to be not applicable, the NA response space would have been filled in.

DO NOT STAPLE OR OTHERWISE DAMAGE THE ANSWER SHEET

PRIVACY STATEMENT

In accordance with paragraph 8, AFR 12-35, the following information is provided as required by the Privacy Act of 1974.

a. Authority

(1) 5 U.S.C. 301, Departmental Regulations, and/or

(2) 10 U.S.C. 8012, Secretary of the Air Force, Powers, Duties, Delegation by Compensation, and/or

(3) DOD Instruction 1100.13, 17 Apr 68, Surveys of Department of Defense Personnel, and/or

(4) AFR 30-23, 22 Sep 76, Air Force Personnel Survey Program.

b. Principal Purpose. The survey is being conducted to collect information to be used in research aimed at illuminating and providing inputs to the solution of problems of interest to the Air Force and/or DOD.

c. Routine Uses. The survey data will be converted to information for use in research of management related problems. Results of the research, based on the data provided, will be included in written master's theses and may also be included in published articles, reports, or text. Distribution of the results of the research, based on the survey data, whether in written form or presented orally, will be unlimited.

d. Participation in this survey is entirely voluntary.

e. No adverse action of any kind may be taken against any individual who elects not to participate in any or all of this survey.

PERSONAL BELIEFS

Instructions

This portion of the questionnaire relates to the way in which certain important events in our society affect different people. Each of the five items consists of a pair of alternatives labelled A or B. Using the scale below, indicate which statement most closely follows your own beliefs and record it on your answer sheet.

- 1 = I strongly agree more with statement A
- 2 = I moderately agree more with statement A
- 3 = I slightly agree more with statement A
- 4 = I slightly agree more with statement B
- 5 = I moderately agree more with statement B
- 6 = I strongly agree more with statement B

1. A Becoming a success is a matter of hard work; luck has little or nothing to do with it.
 B Getting a good job depends mainly on being in the right place at the right time.
2. A Getting people to do the right thing depends on ability; luck has little or nothing to do with it.
 B Who gets to be the boss often depends on who was lucky enough to be in the right place first.
3. A There is really no such thing as luck.
 B Most people don't realize the extent to which their lives are controlled by accidental happenings.
4. A It is impossible for me to believe that chance or luck plays an important role in my life.
 B Many times I feel that I have little influence over the things that happen to me.
5. A What happens to me is my own doing.
 B Sometimes I feel that I don't have enough control over the direction my life is taking.

JOB/ROLE ATTITUDES

Instructions

The following five statements refer to your attitudes concerning your role in the organization. Indicate your agreement with each statement by selecting one of the following responses:

- 1 = Strongly disagree
- 2 = Moderately disagree
- 3 = Slightly disagree
- 4 = Neither agree nor disagree
- 5 = Slightly agree
- 6 = Moderately agree
- 7 = Strongly agree

- 6. I feel certain about how much authority I have.
- 7. I have clear, planned goals and objectives for my job.
- 8. I know exactly what my responsibilities are.
- 9. I know exactly what is expected of me.
- 10. Explanation is clear of what has to be done.

The following statements also pertain to your job and role in the organization. Use the scale below to indicate to what extent each of the statements is applicable in your situation.

- 1 = Not at all
- 2 = To a very little extent
- 3 = To a little extent
- 4 = To a moderate extent
- 5 = To a fairly large extent
- 6 = To a great extent
- 7 = To a very great extent

- 11. I have to buck a rule or policy in order to carry out an assignment.
- 12. I receive incompatible (conflicting) requests from two or more people.
- 13. I do things required in my job that are apt to be accepted by one person and not accepted by others.
- 14. I receive an assignment without adequate resources (manpower, materials, etc.).

SUPERVISOR'S ASSESSMENT OF YOUR PERFORMANCE

The following five statements deal with feedback you receive from your supervisor concerning your performance. Your frame of reference should be your supervisor's evaluation of your performance in terms of formal feedback, (i.e., periodic, written performance appraisals) and informal feedback (i.e., verbal communication on a day-to-day basis). Please think carefully about his/her evaluations of you over the past six months or so.

Based upon the feedback you have received from your supervisor, use the rating scale below to indicate how your job performance would compare with other employees doing similar work.

- 1 = Far worse
- 2 = Much worse
- 3 = Slightly worse
- 4 = About average
- 5 = Slightly better
- 6 = Much better
- 7 = Far better

- 15. Compared with other employees doing similar work, your supervisor considers the quantity of the work you produce to be:
- 16. Compared with other employees doing similar work, your supervisor considers the quality of the work you produce to be:
- 17. Compared with other employees performing similar work, your supervisor believes the efficiency of your use of available resources (money, materials, personnel) in producing a work product to be:
- 18. Compared with other employees performing similar work, your supervisor considers your ability in anticipating problems and either preventing or minimizing their effects to be:
- 19. Compared with other employees performing similar work, your supervisor believes your adaptability/flexibility in handling high-priority work (e.g., "crash projects" and sudden schedule changes) is:

PERSONAL FEELINGS

Instructions

Indicate your agreement with the following ten statements by selecting one of the following responses:

- 1 = Strongly disagree
- 2 = Moderately disagree
- 3 = Slightly disagree
- 4 = Neither agree nor disagree
- 5 = Slightly agree
- 6 = Moderately agree
- 7 = Strongly agree

- 20. I hate to wait on anything or anybody.
- 21. I am frequently in a hurry, even when I don't have to be.
- 22. I frequently get irritated when a person takes too long in making his/her point in a normal conversation.
- 23. I get agitated when someone is late in meeting with me.
- 24. I would describe myself as a very competitive person.
- 25. Winning (or being number one) is a major point of my life.
- 26. Of all my interests, work gives me the highest satisfaction.
- 27. The more involved I am in my work, the better I feel.
- 28. I demand a great deal of myself.
- 29. I demand a great deal of others.

PERCEIVED PRODUCTIVITY

Introduction

The four statements below deal with the output of your group. Indicate your agreement with the statement by selecting the answer which best represents your attitude concerning your work group.

- 1 - Strongly disagree
- 2 - Moderately disagree
- 3 - Slightly disagree
- 4 - Neither agree nor disagree
- 5 - Slightly agree
- 6 - Moderately agree
- 7 - Strongly agree

- 30. The quality of output of your work group is very high.
- 31. When high priority work arises, such as short suspenses, crash programs, and schedule changes, the people in my work group do an outstanding job in handling these situations.
- 32. Your work group's performance in comparison to similar work groups is very high.
- 33. The quantity of output of your work group is very high.

JOB INVENTORY

Instructions

Below are seven items which relate to your job. Read each statement carefully and then decide to what extent the statement is true of your job. Indicate the extent that the statement is true for your job by choosing the statement below which best represents your job.

- 1 = Not at all
- 2 = To a very little extent
- 3 = To a little extent
- 4 = To a moderate extent
- 5 = To a fairly large extent
- 6 = To a great extent
- 7 = To a very great extent

- 34. To what extent does your job provide a great deal of freedom and independence in scheduling your work and selecting your own procedures to accomplish it?
- 35. To what extent does your job give you freedom to do your work as you see fit?
- 36. To what extent do you use your time for weekly or monthly planning?
- 37. To what extent do you use your time for daily planning?
- 38. To what extent is there conflict between members of your work group?
- 39. To what extent is there conflict between your work group and another work group in your organization?
- 40. To what extent is there conflict between your organization and another organization with which you have some work-related dealings?

JOB EFFORT RATING

41. As fairly and objectively as you can, rate the typical amount of effort you normally put into doing your work.

- 1 = Very little effort
- 2 = Enough effort to get by
- 3 = Moderate effort
- 4 = More effort than most
- 5 = Very much effort

GOAL AGREEMENT

Use the following rating scale to indicate the degree of compatibility between your goals and those of your organization.

- 1 = Not at all
- 2 = To a very little extent
- 3 = To a little extent
- 4 = To a moderate extent
- 5 = To a fairly large extent
- 6 = To a great extent
- 7 = To a very great extent

42. To what extent are your organization's goals compatible with your own personal goals?

PERFORMANCE INTENTIONS

Based upon the feedback you have received concerning your job performance, what plans do you have for changing your job performance:

43. In the future I intend to:

- 1 = Greatly slack off on my job performance
- 2 = Somewhat slack off on my job performance
- 3 = Stay the same on my job performance
- 4 = Somewhat improve on my job performance
- 5 = Greatly improve on my job performance

ORGANIZATIONAL/JOB COMPONENTS

Instructions

Below are 13 items which relate to your job. Read each statement carefully and then decide to what extent the statement is true of your job. Indicate the extent that the statement is true for your job by choosing the statement below which best represents your job.

- 1 = Not at all
- 2 = To a very little extent
- 3 = To a little extent
- 4 = To a moderate extent
- 5 = To a fairly large extent
- 6 = To a great extent
- 7 = To a very great extent

- 44. To what extent does doing your job well affect a lot of people?
- 45. To what extent is your job significant, in that it affects others in some important way?
- 46. To what extent are your job performance goals clear and specific?
- 47. To what extent do you know exactly what is expected of you in performing your job?
- 48. To what extent would you like to have the opportunity for personal growth in your job?
- 49. To what extent would you like to have the opportunity to use your skills in your job?
- 50. To what extent is your work group involved in establishing goals?
- 51. To what extent are group meetings used to solve problems and establish goals and objectives within your work group?
- 52. To what extent are you allowed to provide ideas for solving job-related problems?
- 53. To what extent are your ideas utilized in solving job-related problems?
- 54. To what extent does your job provide you with the opportunity to accomplish something worthwhile?
- 55. To what extent does your job enable you to use your natural talents?
- 56. To what extent does your job utilize your training for that job?

SUPERVISOR INVENTORY

Instructions

The nine statements below describe characteristics of managers or supervisors. Indicate your agreement by choosing the statement below which best represents your attitude concerning your supervisor.

- 1 = Strongly disagree
- 2 = Moderately disagree
- 3 = Slightly disagree
- 4 = Neither agree nor disagree
- 5 = Slightly agree
- 6 = Moderately agree
- 7 = Strongly agree

- 57. My supervisor is a good planner.
- 58. My supervisor establishes good work procedures.
- 59. My supervisor always helps me improve my performance.
- 60. My job performance has improved due to feedback received from my supervisor.
- 61. My supervisor is supportive of the people who work for him/her.
- 62. My supervisor provides close control and firm direction.
- 63. My supervisor sets procedures and work to be done.
- 64. My supervisor spends too much time in minor details.
- 65. My supervisor requires paperwork that is not needed for the job.

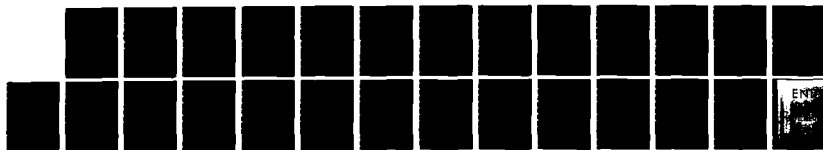
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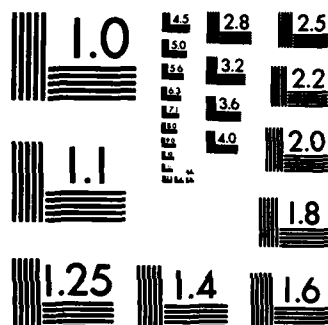
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

JOB STRESS INVENTORY

Instructions

Please answer each of the following 25 statements by choosing the response which most accurately reflects the degree to which the particular statement is a source of stress for you in your job.

Choose one of these responses and blacken in the value on your computer-scored answer sheet.

| | <u>Amount of Stress</u> | | | | | | |
|--|-----------------------------------|---|---|---|---|---|---|
| | <u>No Stress</u> <u>at all</u> | | | <u>A Great Deal</u> <u>of stress</u> | | | |
| 66. Over-workload | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 67. Under-workload | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 68. Relationship with my boss | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 69. Relationship with my co-workers | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 70. Lack of authority and influence | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 71. Lack of challenges | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 72. Excessive challenges | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 73. Overly supervised | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 74. Lack of participation and consultation in my organization | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 75. Lack of communication and coordination in my organization | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 76. Lack of clarity in my job (responsibilities and/or expected performance level) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Choose one of these responses and blacken
in the value on your computer-scored
answer sheet.

| | <u>Amount of Stress</u> | | | | | | |
|---|-------------------------|---|---|---------------------------|---|---|---|
| | No Stress at all | | | A Great Deal of stress | | | |
| 77. Time pressures (deadlines) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 78. Availability of resources for my work (materials, equipment, people) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 79. Lack of feedback to me about my work | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 80. Lack of constructive feedback and assistance in my work | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 81. Promotion opportunities | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 82. Personal growth and development opportunities | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 83. Rates of pay (salary) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 84. Incentive programs (other than salary) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 85. Excessive travel | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 86. My family's attitude toward my work | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 87. The nature of my work | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 88. Conflicting demands of my work and my family and/or social life | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 89. Lack of technical and/or supervisory training | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 90. Conflict between my goals (needs) and goals of my supervisor/organization | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

ORGANIZATIONAL INVENTORY

Instructions

Below are six items which describe characteristics of your organization. Indicate your agreement by choosing the statement below which best represents your opinion concerning your organization.

- 1 = Strongly disagree
- 2 = Moderately disagree
- 3 = Slightly disagree
- 4 = Neither agree nor disagree
- 5 = Slightly agree
- 6 = Moderately agree
- 7 = Strongly agree

- 91. Your organization is very interested in the attitudes of the group members toward their jobs.
- 92. Your organization has a very strong interest in the welfare of its people.
- 93. There are far too many policies and regulations constricting my effective job performance.
- 94. I could do my job better if the organization had fewer rules.
- 95. My relationship with my peers is a good one.
- 96. There are very few disagreements or conflicts between myself and my co-workers.

DEALING WITH OTHERS

Instructions

The following five statements pertain to your approach in dealing with other people. Indicate your agreement with each statement by selecting the response which best represents your opinion.

- 1 - Not at all
- 2 - To a very little extent
- 3 - To a little extent
- 4 - To a moderate extent
- 5 - To a fairly large extent
- 6 - To a great extent
- 7 - To a very great extent

- 97. To what extent do you call it to his/her attention when a person is highly unfair?
- 98. To what extent do you speak out or protest when someone takes your place in line?
- 99. To what extent do you call attention to the situation in which a late-comer is waited on before you?
- 100. To what extent do you insist that your landlord (mechanic, repairman, etc.) make repairs that are his/her responsibility to make?
- 101. To what extent are you able to speak up for your viewpoint when you differ with a person you respect?

SOCIAL ENVIRONMENT INVENTORY

Instructions

The three items below relate to your social life away from your job. Indicate how much you agree/disagree with each item. Choose the statement below which best describes your degree of agreement.

- 1 = Strongly disagree
- 2 = Moderately disagree
- 3 = Slightly disagree
- 4 = Neither agree nor disagree
- 5 = Slightly agree
- 6 = Moderately agree
- 7 = Strongly agree

- 102. I am extremely well known in my community, and am well respected for my contributions.
- 103. I am extremely involved in social activities outside my job.
- 104. I am frequently asked to contribute time and effort in community projects.

HOMELIFE INVENTORY

Instructions

Please indicate your agreement with each of the six statements by selecting the response which best represents your opinion.

- 1 = Strongly disagree
- 2 = Moderately disagree
- 3 = Slightly disagree
- 4 = Neither agree nor disagree
- 5 = Slightly agree
- 6 = Moderately agree
- 7 = Strongly agree

- 105. My unfulfilled homelife greatly adds to my frustration.
- 106. My lifestyle away from my job is extremely tense and stressful.

107. Things are going well between my spouse and me (or best boyfriend/girlfriend).
108. I am satisfied with my family life.
109. My relationship with my spouse (or best boyfriend/girlfriend) is a good one.
110. I really enjoy my time together with my spouse (or best boyfriend/girlfriend).

PHYSICAL EXERCISE

111. Which statement most accurately describes the amount of your current (for past 2 months or so) exercise program?
 1. I do not exercise or I exercise one day or less a week.
 2. I exercise at least twice a week.
 3. I exercise at least three days a week.
 4. I exercise at least four days a week.
 5. I exercise at least five days a week.
 6. I exercise at least six days a week.
 7. I exercise every day.
112. Which statement most accurately describes the type of exercise program you regularly experience?
 1. I do not exercise regularly.
 2. I mostly engage in very light physical exercise activities (e.g., short walks, bowling).
 3. I mostly engage in light physical exercise activities (e.g., light dancing, long walks).
 4. I mostly engage in moderately heavy physical exercise activities (e.g., frequent tennis, volleyball, racquetball).
 5. I mostly engage in heavy physical exercise activities (e.g., soccer, frequent but short-distance swimming, hiking, jogging, & cycling).
 6. I mostly engage in very strenuous physical exercise activities (e.g., long-distance swimming, hiking, jogging, & cycling).
113. If you "jog" regularly, the average number of miles you jog per week is:
 1. I do not jog or I do not jog regularly.
 2. 6 - 9 miles
 3. 10-13 miles
 4. 14-17 miles
 5. 18-21 miles
 6. 22-25 miles
 7. more than 25 miles

114. If you "swim" regularly, the average number of miles you swim per week is:

1. I do not swim or I do not swim regularly
2. 6-9 miles
3. 10-13 miles
4. 14-17 miles
5. 18-21 miles
6. 22-25 miles
7. more than 25 miles

115. If you "cycle" regularly, the average number of miles you cycle per week is:

1. I do not cycle or I do not cycle regularly
2. 10-14 miles
3. 15-19 miles
4. 20-24 miles
5. 25-29 miles
6. 30-34 miles
7. more than 34 miles

SOCIAL SUPPORT

Instructions

Please indicate how you feel about the type and degree of "support" you receive when you need it the most. Select one of the responses below for each of the following six statements.

- 1 = Terrible
- 2 = Unhappy
- 3 = Mostly dissatisfied
- 4 = Mixed (about equally satisfied and dissatisfied)
- 5 = Mostly satisfied
- 6 = Pleased
- 7 = Delighted

116. The support from your immediate boss.

117. The support from top management.

118. The support from co-workers.

119. The support from my family.

120. The support from friends.

121. The support from social/religious organizations I participate in.

JOB SATISFACTION

Instructions

Please indicate the degree to which you are satisfied with various aspects of your job by selecting one of the responses below for each of the following five questions.

- 1 = Terrible
- 2 = Unhappy
- 3 = Mostly dissatisfied
- 4 = Mixed (about equally satisfied and dissatisfied)
- 5 = Mostly satisfied
- 6 = Pleased
- 7 = Delighted

- 122. How do you feel about your job as a whole?
- 123. How do you feel about the people you work with -- your co-workers?
- 124. How do you feel about the work you do on your job -- e.g., the challenge, importance, variety, feelings of accomplishment?
- 125. How do you feel about where you work -- the general environment/physical surroundings?
- 126. How do you feel about what you have available for doing your job -- e.g., equipment, information, and so on?

PERSONAL PREFERENCES

Instructions

Please use the scale below to indicate the extent to which you agree with the following six statements.

- 1 = Strongly disagree
- 2 = Moderately disagree
- 3 = Slightly disagree
- 4 = Neither agree nor disagree
- 5 = Slightly agree
- 6 = Moderately agree
- 7 = Strongly agree

- 127. I must admit that it makes me angry when other people interfere with my daily activity.
- 128. I find that a well-ordered mode of life with regular hours is congenial to my temperament.
- 129. It bothers me when something unexpected interrupts my daily routine.
- 130. I don't like to undertake any project unless I have a pretty good idea as to how it will turn out.
- 131. I find it hard to set aside a task that I have undertaken, even for a short time.
- 132. I do not enjoy having to adapt myself to new and/or unusual situations.

PERSONAL NEEDS

Instructions

Please use the scale below to indicate the extent to which you agree with the following three questions.

- 1 = Not at all
- 2 = To a very little extent
- 3 = To a little extent
- 4 = To a moderate extent
- 5 = To a fairly large extent
- 6 = To a great extent
- 7 = To a very great extent

- 133. How important is it to you to know, in detail, what you have to do on a job?
- 134. How important is it to you to know, in detail, how you are supposed to do a job?
- 135. How important is it to you to know, in detail, how well you are doing a job?

PERSONAL CHARACTERISTICS

Instructions

Indicate your agreement with the following six statements by selecting one of the following responses.

- 1 = Strongly disagree
- 2 = Moderately disagree
- 3 = Slightly disagree
- 4 = Neither agree nor disagree
- 5 = Slightly agree
- 6 = Moderately agree
- 7 = Strongly agree

- 136. There are very few things about myself I'd change if I could.
- 137. I have a high opinion of myself.
- 138. I feel that I have a number of good qualities.
- 139. I have a great deal of respect for myself.
- 140. I feel I have a great deal to be proud of.
- 141. On the whole, I am very satisfied with myself.

FOOD CONSUMPTION INVENTORY

Instructions

Use the scale below to answer the five questions for this section.

- 1 = 2-3 times each month (or less).
- 2 = Once each week.
- 3 = 2-3 times each week.
- 4 = 4-5 times each week.
- 5 = 6-8 times each week.
- 6 = 9-11 times each week.
- 7 = 12 or more times each week.

How many times do you consume the following food items?

- 142. Eggs
- 143. Dairy products (whole milk, ice cream, cheese, etc. - skim milk doe not count).
- 144. Beef and pork (steak, hamburger, sausage, spare ribs, etc.).
- 145. Fried foods (chicken, french fries, potato chips, etc.).
- 146. Butter (not margarine) and/or sour cream.

ANXIETY SYMPTOMS

Instructions

Please answer each of the following 14 statements by choosing the response which most accurately reflects the degree to which the particular symptom describes you poorly or well in your recent past few weeks or month.

Choose one of these responses and blacken in the value on your computer-scored answer sheet.

| | Describes Me Poorly | | | | | | | Describes Me Very Well | |
|----------------------------------|---------------------|---|---|---|---|---|---|------------------------|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
| 147. Constant worrying | | | | | | | | | |
| 148. Trouble relaxing (restless) | | | | | | | | | |
| 149. Trouble sleeping | | | | | | | | | |

Choose one of these responses and
blacken in the value on your
computer-scored answer sheet.

| | Describes Me Poorly | | | | | Describes Me Very Well | |
|--|------------------------|---|---|---|---|---------------------------|---|
| 150. Trouble concentrating | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 151. Trouble thinking through clearly | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 152. Very irritable | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 153. Very moody | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 154. Very aggressive | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 155. Very defensive | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 156. Short-tempered | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 157. Very apprehensive | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 158. Trouble getting motivated | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 159. Loss of appetite | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 160. Compulsive eating | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

PHYSICAL PROBLEMS

Instructions

Please answer each of the following 11 statements by choosing the response which most accurately reflects the degree to which you have experienced the particular problem during the past month.

- 1 = Not at all
- 2 = To a very little extent
- 3 = To a little extent
- 4 = To a moderate extent
- 5 = To a fairly large extent
- 6 = To a great extent
- 7 = To a very great extent

- 161. Constant fatigue
- 162. Recurring moderate headaches
- 163. Recurring severe headaches
- 164. Dizziness
- 165. Hyperventilation (excessive rate of respiration)
- 166. Upset stomach
- 167. Shortness of breath (at rest)
- 168. Pounding (or hard beating) heart
- 169. Increased perspiration in hands or feet
- 170. High blood pressure
- 171. Low blood pressure

BACKGROUND INFORMATION

Instructions

The last section of this survey concerns your background. Please darken the space on the optical scan form which corresponds with your response to each question.

172. Total months in this organization is:

- 1 - Less than 1 month.
- 2 - More than 1 month, less than 6 months.
- 3 - More than 6 months, less than 12 months.
- 4 - More than 12 months, less than 18 months.
- 5 - More than 18 months, less than 24 months.
- 6 - More than 24 months, less than 36 months.
- 7 - More than 36 months.

173. Total months experience in present job is:

- 1 - Less than 1 month.
- 2 - More than 1 month, less than 6 months.
- 3 - More than 6 months, less than 12 months.
- 4 - More than 12 months, less than 18 months.
- 5 - More than 18 months, less than 24 months.
- 6 - More than 24 months, less than 36 months.
- 7 - More than 36 months.

174. Your race is:

- 1 - American Indian or Alaskan Native
- 2 - Asian or Pacific Islander
- 3 - Black, not of Hispanic Origin
- 4 - Hispanic
- 5 - White, not of Hispanic Origin
- 6 - Other

175. Your sex is:

- 1 - Male
- 2 - Female

176. Your highest educational level obtained was:

- 1 - Non-high school graduate
- 2 - High school graduate or GED
- 3 - Some college work
- 4 - Bachelor's degree
- 5 - Some graduate work
- 6 - Master's degree
- 7 - Doctoral degree

177. How many people do you directly supervise (i.e., those for which you write performance reports)?

- 1 - None
- 2 - One to two
- 3 - Three to five
- 4 - Six to eight
- 5 - Nine to twelve
- 6 - Thirteen to twenty
- 7 - Twenty-one or more

178. Your work requires you to work primarily:

- 1 - Alone
- 2 - With one or two people
- 3 - As a small group team member (3-5 people)
- 4 - As a large group team member (6 or more people)
- 5 - Other

179. How stable are your work hours?

- 1 - Highly stable -- routine 8 hours a day.
- 2 - Very stable -- nearly routine 8 hour day.
- 3 - Moderately stable -- shift work which periodically changes.
- 4 - Slightly unstable -- irregular working hours.
- 5 - Highly unstable -- frequent business trip or away from office.

180. How stable is your work location?

- 1 - Highly stable -- six to eight hours per day at one central location, office or desk.
- 2 - Very stable -- at least half the day at office or desk.
- 3 - Slightly unstable -- work predominantly away from desk.
- 4 - Highly unstable -- constantly on road (i.e. traveling salesman)
- 5 - Periodically unstable -- work at one location for a short period of time then another location for a short period of time (i.e., oil well driller, consultant, doctor -- working hospital and office, etc.).

181. Which of the following statements best describes your marital status?

NA - Not married -- no children

- 1 - Married -- Spouse is employed outside home.
- 2 - Married -- Separated due to employment.
- 3 - Married -- Separated by choice.
- 4 - Married -- Spouse is not employed.
- 5 - Married -- Spouse is not employed -- separated due to employment.
- 6 - Divorced -- Do not have custody of children.
- 7 - Single parent.

182. If I have my own way, I will not be working for my present organization a year from now.

- 1 - Strongly disagree
- 2 - Slightly disagree
- 3 - Neither agree nor disagree
- 4 - Slightly agree
- 5 - Strongly agree

183. Have you been diagnosed as having coronary artery disease or coronary heart disease?

- 1. Yes
- 2. No

184. Have you been diagnosed as having an ulcer?

- 1. Yes
- 2. No

185. Do you smoke (cigarettes, cigars, and/or pipe)?

- 1. I smoke
- 2. I used to smoke but stopped in past 6 months
- 3. I used to smoke but stopped over 6 months ago
- 4. I have never smoked as a habit

186. You smoke the following number of cigarettes:

NA - I do not smoke cigarettes

- 1. Less than 5 per day
- 2. 6-10 per day
- 3. 11-15 per day
- 4. 16-20 per day
- 5. 21-25 per day
- 6. 26-30 per day
- 7. More than 30 per day

187. You smoke the following number of cigars or pipe bowls:

NA - I do not smoke either cigars or pipes

- 1. Less than 2 cigars or bowls per day
- 2. 2-4 cigars or bowls per day
- 3. 5-6 cigars or bowls per day
- 4. 7-8 cigars or bowls per day
- 5. 9-10 cigars or bowls per day
- 6. 11-12 cigars or bowls per day
- 7. More than 12 cigars or bowls per day

188. Consult the chart below to answer the following question. Your weight category (according to height) is:

NOTE: Men - use top table; women use bottom table.

Locate your height; move across the row until you find your weight. The number at the top of your weight column is your weight category. Mark this number on your answer sheet.

| MEN | | | | | | | |
|------------------------|-----------------------|---------|---------|---------|---------|---------|------------------------|
| WEIGHT CATEGORY | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Height | This Weight and Under | | | | | | This Weight or Greater |
| 6' 4" | 138 | 139-155 | 156-171 | 172-190 | 191-208 | 209-227 | 228 |
| 6' 3" | 134 | 135-150 | 151-166 | 167-185 | 186-203 | 204-221 | 222 |
| 6' 2" | 130 | 131-146 | 147-161 | 162-180 | 181-197 | 198-215 | 216 |
| 6' 1" | 126 | 127-142 | 143-157 | 158-175 | 176-192 | 193-209 | 210 |
| 6' 0" | 123 | 124-139 | 140-153 | 154-170 | 171-186 | 187-203 | 204 |
| 5' 11" | 120 | 121-135 | 136-149 | 150-165 | 166-181 | 182-197 | 198 |
| 5' 10" | 117 | 118-131 | 132-146 | 147-160 | 161-175 | 176-191 | 192 |
| 5' 9" | 114 | 115-128 | 129-141 | 142-156 | 157-171 | 172-186 | 187 |
| 5' 8" | 110 | 111-124 | 125-137 | 138-152 | 153-166 | 167-181 | 182 |
| 5' 7" | 107 | 108-121 | 122-133 | 134-147 | 148-161 | 162-175 | 176 |
| 5' 6" | 104 | 105-117 | 118-129 | 130-143 | 144-156 | 157-171 | 172 |
| 5' 5" | 102 | 103-114 | 115-126 | 127-139 | 140-152 | 153-166 | 167 |
| 5' 4" | 99 | 100-112 | 113-123 | 124-136 | 137-149 | 150-162 | 163 |
| 5' 3" | 97 | 98-109 | 110-120 | 121-133 | 134-145 | 146-159 | 160 |
| 5' 2" | 94 | 95-106 | 107-117 | 118-129 | 130-141 | 142-154 | 155 |

| WOMEN | | | | | | | |
|------------------------|-----------------------|---------|---------|---------|---------|---------|------------------------|
| WEIGHT CATEGORY | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Height | This Weight and Under | | | | | | This Weight or Greater |
| 6' 0" | 115 | 116-130 | 131-143 | 144-159 | 160-174 | 176-190 | 191 |
| 5' 11" | 112 | 113-126 | 127-139 | 140-155 | 156-170 | 171-185 | 186 |
| 5' 10" | 109 | 110-122 | 123-135 | 136-151 | 152-165 | 166-180 | 181 |
| 5' 9" | 106 | 107-119 | 120-131 | 132-147 | 148-161 | 162-175 | 176 |
| 5' 8" | 102 | 103-115 | 116-127 | 128-143 | 144-156 | 157-171 | 172 |
| 5' 7" | 99 | 100-112 | 113-123 | 124-139 | 140-152 | 153-166 | 167 |
| 5' 6" | 96 | 97-108 | 109-119 | 120-135 | 136-150 | 149-161 | 162 |
| 5' 5" | 93 | 94-104 | 105-115 | 116-130 | 131-142 | 143-155 | 156 |
| 5' 4" | 90 | 91-102 | 103-112 | 113-126 | 127-138 | 139-150 | 151 |
| 5' 3" | 88 | 89- 99 | 100-109 | 110-122 | 123-133 | 134-145 | 146 |
| 5' 2" | 86 | 87- 96 | 97-106 | 107-119 | 120-130 | 131-142 | 143 |
| 5' 1" | 83 | 84- 94 | 95-103 | 104-116 | 117-127 | 128-138 | 139 |
| 5' 0" | 81 | 82- 91 | 92-100 | 101-113 | 114-123 | 124-135 | 136 |
| 4' 11" | 78 | 79- 88 | 89- 97 | 98-110 | 111-120 | 121-131 | 132 |
| 4' 10" | 77 | 78- 86 | 87- 95 | 96-107 | 108-117 | 118-127 | 128 |

189. Are you currently (within the last week) taking any prescribed or non-prescribed medication?

1. No
2. Yes. If yes, then fill in your identification number (the one on the upper right corner of your optical scan form) and complete the page.

PLACE I.D. NUMBER HERE

A. Medication Name:

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

B. Use (if known):

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

C. Dosage (if known):

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

BIBLIOGRAPHY

- Appley, M. H., and R. Trumbull. Psychological Stress. New York: Appleton-Century-Crofts, 1967.
- Blau, Gary. "An Empirical Investigation of Job Stress, Social Support, Service Length, and Job Strain," Organizational Behavior and Human Performance, 27 (1981), pp. 279-302.
- Blumenthal, James H., R. Sanders Williams, Redford B. Williams, Jr., and Andrew G. Wallace. "Effects of Exercise on the Type A (Coronary-Prone) Behavior Pattern," Psychosomatic Medicine, 42 (1980), pp. 289-296.
- Brown, Gregory M., Don S. Schalch, and Seymour Reichlin. "Patterns of Growth Hormone and Cortisol Responses to Psychological Stress in the Squirrel Monkey," Endocrinology, 88, No. 4 (1971), pp. 956-963.
- Brownell, Kelly D., Paul S. Bachorik, and Robert S. Ayerle. "Changes in Plasma Lipid and Lipoprotein Levels in Men and Women After a Program of Moderate Exercise," Circulation, 65, No. 3 (1982), pp. 477-484.
- Caplan, Robert D., Sidney Cobb, and John R. P. French, Jr. "Relationships of Cessation of Smoking with Job Stress, Personality, and Social Support," Journal of Applied Psychology, 60, No. 2 (1975), pp. 211-219.
- Chesney, Margaret A., and Ray H. Rosenman. "Type A Behavior: Observations on the Past Decade," Heart and Lung, 11, No. 1 (1982), pp. 12-18.
- Cohen, Judith Blackfield, Karen A. Matthews, and Ingrid Waldron. "Coronary-Prone Behavior: Developmental and Cultural Considerations," In T. M. Dembroski, S. M. Weiss, J. L. Shields, S. G. Haynes, and M. Feinleib (Eds.), Coronary-Prone Behavior. New York: Springer, 1978, pp. 184-190.
- Cooper, C. L., and R. Payne. Stress At Work. New York: Wiley, 1978.
- Cresanta, James L., Sathanur R. Srinivasan, Theda A. Foster, Larry S. Webber, and Gerald S. Berenson. "Serum Lipoprotein Levels in Children: Epidemiologic and Clinical Implications," Journal of Chronic Disease, 35 (1982), pp. 41-51.

- Dembroski, T. M., J. M. MacDougall, J. A. Herd, and J. L. Shields. "Effects of Level of Challenge on Pressor and Heart Rate Responses in Type A and B Subjects," Journal of Applied Psychology, No. 9 (1979), pp. 208-228.
- Dressendorfer, Rudolph H., Charles E. Wade, Conrad Hornick, and Gerald C. Timmis. "High-Density Lipoprotein-Cholesterol in Marathon Runners During a 20-Day Road Race," Journal of the American Medical Association, 247 (1982), pp. 1715-1717.
- Ehnholm, Christian, Jussi K. Huttunen, Pirjo Pietinen, Ulla Leino, Marja Mutanen, Ella Kostiainen, Jarmo Pikkarainen, Rita Dougherty, James Iacono, and Pekka Puska. "Effect of Diet on Serum Lipoproteins in a Population With a High Risk of Coronary Heart Disease," The New England Journal of Medicine, 307 (1982), pp. 850-855.
- Feinleib, M., and W. B. Kannel. "Relation of Parental History of Coronary Heart Disease to Risk Factors in Young adults: The Framingham Offspring Study," Circulation, 54, (suppl. II) (1976), p. II-52.
- Fraser, G. E., and R. J. Swannell. "Diet and Serum Cholesterol in Seventh-Day Adventists: A Cross-Sectional Study Showing Significant Relationships," Journal of Chronic Disease, 34 (1981), pp. 487-501.
- French, John R. P., Jr. "Person-Role Fit," In A. McLean (Ed.), Occupational Stress. Springfield IL: C. C. Thomas, 1974, pp. 70-79.
- Friedman, Meyer, and Ray H. Rosenman. Type A Behavior and Your Heart. New York: Fawcett Crest, 1974.
- _____, Meyer, R. H. Rosenman, and V. Carroll. "Changes in the Serum Cholesterol and Blood-Clotting Time in Men Subjected to Cyclic Variation of Occupational Stress," Circulation, 17, (1958), pp. 852-861.
- Fye, Captain Samuel P., USAF, and First Lieutenant Charles W. Staton, USAF. "Individual and Organizational Variables' Relationships to Coronary Heart Disease." Unpublished master's thesis. LSSR 3-81. AFIT/LS, Wright-Patterson AFB OH, 1981. AD A105128.
- Glass, David C. Behavior Patterns, Stress, and Coronary Disease. Hillsdale NJ: Lawrence Erlbaum Associates, Publishers, 1977.

- _____. "Stress, Behavior Patterns, and Coronary Disease," American Scientist, 65 (1977), pp. 177-187.
- _____, and J. E. Singer. Urban Stress: Experiments on Noise and Social Stressors. New York: Academic Press, 1972.
- Gordon, T., W. P. Castelli, M. C. Hjortland, and W. B. Kannel. "The Prediction of Coronary Heart Disease by High-Density and Other Lipoproteins: An Historical Perspective," In B. M. Rifkind and R. I. Levy (Eds.), Hyperlipidemia: Diagnosis and Therapy. New York: Grune and Stratton, 1977, pp. 71-78.
- Gordon, David J., Joseph L. Witztum, Donald Hunninghake, Sherry Gates, and Charles J. Glueck. "Habitual Physical Activity and High-Density Lipoprotein Cholesterol in Men with Primary Hypercholesterolemia," Circulation, 67, No. 3 (1983), pp. 512-520.
- Harnett, Donald L. Statistical Methods. Reading MA: Addison-Wesley Publishing Company, 1982.
- Hartung, G., Harley, William G. Squires, and Antonio M Gotto, Jr. "Effect of Exercise Training on Plasma High-Density Lipoprotein Cholesterol in Coronary Disease Patients," American Heart Journal, 101 (1981), pp. 181-184.
- Hull, C. Hadlai, and Norman H. Nie. SPSS: Update 7-9. New York: McGraw-Hill Book Company, 1981.
- Jenkins, C. David. "Psychologic and Social Precursors of Coronary Disease," The New England Journal of Medicine, 284, No. 6, (1971), pp. 307-316.
- _____, and Stephen J. Zyzanski. "Behavioral Risk Factors and Coronary Heart Disease," Psychosomatic Medicine, 34 (1980), pp. 149-177.
- LaPorte, Ronald E., Jane A. Cauley, Collin M. Kinsey, Wayne Corbett, Robert Robertson, Rivka Black-Sandler, Lewis H. Kuller, and Jeff Falkel. "The Epidemiology of Physical Activity in Children, College Students, Middle-Aged Men, Menopausal Females, and Monkeys," Journal of Chronic Disease, 35 (1982), pp. 787-795.
- Lazarus, R. S. Psychological Stress and the Coping Process. New York: McGraw-Hill, 1966.

- _____. "A Cognitively Oriented Psychologist Looks At Biofeedback," American Psychologist, 30 (1975), pp. 553-561.
- Lofquist, L. H., and R. V. Dawis. Adjustment to Work. New York: Appleton-Century-Crofts, 1969.
- Lund-Larson, P. G., and S. Tretti. "Changes in Smoking Habits and Body Weight After a Three-Year Period: The Cardiovascular Disease Study in Finnmark," Journal of Chronic Disease, 35 (1982), pp. 773-780.
- McDonald, Captain Thomas J., USAF. "An Assessment of the Relationship Between the Coronary-Prone (Type A) Behavior Pattern, Stress, and Coronary Heart Disease." Unpublished master's thesis. LSSR 32-82. AFIT/LS, Wright-Patterson AFB OH, 1982. AD A122809.
- McGrath, J. E. "Stress and Behavior in Organizations," In Marvin D. Dunnette (Ed.), Handbook of Industrial and Organizational Psychology, 1976, pp. 1351-1395.
- McNichols, Charles W. An Introduction to Applied Multivariate Data Analysis. Course Notes. School of Engineering, Air Force Institute of Technology, Wright-Patterson AFB OH, 1980.
- Manuck, S. B., S. A. Craft, and K. J. Gold. "Coronary-Prone Behavior Pattern and Cardiovascular Response," Psychophysiology, 15 (1978), pp. 403-411.
- _____, and F. N. Garland. "Coronary-Prone Behavior, Task Incentive, and Cardiovascular Response," Psychophysiology, 16 (1979), pp. 136-142.
- Marshall, J., and C. L. Cooper. Work, Stress, and the Executive. London: MacMillan, 1978.
- Moll, Patricia P., Charles F. Sing, William H. Weidman, Hymie Gordon, Ralph D. Ellefson, Patricia A. Hodgson, and Bruce A. Kottke. "Total Cholesterol and Lipoproteins in School Children: Prediction of Coronary Heart Disease in Adult Relatives," Circulation, 67, No. 1 (1983), pp. 127-134.
- Myers, J., J. Lindenthal, and M. Pepper. "Life Events, Social Integration, and Psychiatric Symptomatology," Journal of Health and Social Behavior, 16 (1975), pp. 121-127.

- Nie, Norman H., C. Hadlai Hull, Jean G. Jenkins, Karin Steinbrenner, and Dale H. Bent. SPSS: Statistical Package for the Social Sciences. New York: McGraw-Hill Book Company, 1975.
- Patel, Yogesh C., Dankward Kodlin, and Jack P. Strong. "On the Interpretation of Smoking Risks in Atherosclerosis," Journal of Chronic Disease, 33 (1980), pp. 147-155.
- Payne Roy. "Organizational Stress and Social Support," In C. L. Cooper and R. Payne (Eds.), Current Concerns in Occupational Stress. New York: Wiley, 1980, pp. 269-298.
- Pinneau, S. R., Jr. Effects of Social Support on Occupational Stresses and Strains. 84th Annual Convention of American Psychological Association, 1976.
- Pittner, Mark S., and B. Kent Houston. "Response to Stress, Cognitive Coping Strategies, and the Type A Behavior Pattern," Journal of Personal and Social Psychology, 39, No. 1 (1980), pp. 147-157.
- Rahe, Richard H., Linda Hervig, and Ray H. Rosenman. "Heritability of Type A Behavior," Psychosomatic Medicine, 40, No. 6 (1978), pp. 478-486.
- _____, Robert T. Rubin, and Ransom J. Arthur. "The Three Investigators Study: Serum Uric Acid, Cholesterol, and Cortisol Variability During Stresses of Everyday Life," Psychosomatic Medicine, 36 (1974), pp. 258-268.
- _____, Robert T. Rubin, Ransom J. Arthur, and Brian R. Clark. "Serum Uric Acid and Cholesterol Variability," Journal of the American Medical Association, 206 (1968), pp. 2875-2880.
- _____, Robert T. Rubin, E. K. E. Gunderson, and Ransom J. Arthur. "Psychologic Correlates of Serum Cholesterol in Man: A Longitudinal Study," Psychosomatic Medicine, 33 (1971), pp. 399-410.
- Rosenman, Ray H., Meyer Friedman, Reuben Straus, Moses Wurm, Robert Kositchek, Wilfred Hahn, and Nicholas Werthessen. "A Predictive Study of Coronary Heart Disease," Journal of the American Medical Association, 189, No. 1 (1968), pp. 103-110.

- Rotkis, Thomas C., Richard Cote, Edward Coyle, and Jack H. Wilmore. "Relationship Between High Density Lipoprotein Cholesterol and Weekly Running Mileage," Journal of Cardiac Rehabilitation, 2 (1982), pp. 109-112.
- Rubin, Robert T., Richard H. Rahe, Brian R. Clark, and Ransom J. Arthur. "Serum Uric Acid, Cholesterol, and Cortisol Levels: Interrelationships in Normal Men Under Stress," Archives of Internal Medicine, 125 (1970), pp. 815-819.
- Russek, H. I. "Stress, Tobacco, and Coronary Disease in North American Professional Groups," Journal of the American Medical Association, 192 (1965), pp. 189-194.
- _____, and B. L. Zohman. "Relative Significance of Heredity, Diet, and Occupational Stress in Coronary Heart Disease of Young Adults," American Journal of Medical Science, 235 (1958), pp. 266-275.
- Schuler, Randall S. "Definitions and Conceptualization of Stress in Organizations," Organizational Behavior and Human Performance, 25 (1980), pp. 184-215.
- Seligman, M. E. P. Helplessness: On Depression, Development, and Death. San Francisco: Freeman, 1975.
- Tamir, I., G. Heiss, C. J. Glueck, B. Christensen, P. Kwiterovich, and B. M. Rifkind. "Lipid and Lipoprotein Distributions in White Children Ages 6-19 Yr. - The Lipid Research Clinics Program Prevalence Study," Journal of Chronic Disease, 34 (1981), pp. 27-39.
- Ueshima, Hirotugu, Minoru Iida, Takashi Shimamoto, Masamitsu Konishi, Masato Tanigaki, Mitsunori Doi, Noriyuki Nakanishi, Yoshihiro Takayama, Hideki Ozawa, and Yoshio Komachi. "Dietary Intake and Serum Total Cholesterol Level: Their Relationship to Different Lifestyles in Several Japanese Populations," Circulation, 66, No. 3 (1982), pp. 519-526.
- Van Harrison, R. "Person-Environment Fit and Job Stress," In C. L. Cooper and R. Payne (Eds.), Stress at Work. New York: Wiley, 1978, pp. 175-205.
- Williams, R. B., Jr., M. Friedman, D. C. Glass, J. A. Herd, and N. Schneiderman. "Section Summary: Mechanics Linking Behavioral and Pathophysiological Processes," In T. M. Dembroski, S. M. Weiss, J. L. Shields, S. G. Haynes, and M. Feinleib (Eds.), Coronary-Prone Behavior. New York: Springer, 1978, pp. 120-128.

